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1949

The Massachusetts Audubon Society's unique program for conservation education.

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THE MASSACHUSETTS AUDUBON SOCIETY'S
UNIQUE PROGRAM FOR CONSERVATION EDUCATION

Submitted by

Mildred Frances Donnelly
(Ed.B., Rhode Island College of Education, 1945)

In partial fulfillment of requirements
for the Degree, Master of Education.

August, 1949

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CHAPTER I

DEFINITION OF THE PROBLEM

THE PROBLEM

The problem of this thesis is to investigate the activities of The Massachusetts Audubon Society in the field of conservation education.

PURPOSE OF THE STUDY

The purpose of the study is to show the unique quality of the educational program carried on by The Massachusetts Audubon Society; to reveal what this private organization has available in the way of visual aids, free material and services to teachers, schools, youth groups and adult groups; to prove the need for conservation education; to stimulate the teaching of nature in the out-of-doors rather than from a book as a means of creating a conservation attitude toward life within the child.

SCOPE AND LIMITATIONS

This study will include a survey of all the activities of The Massachusetts Audubon Society. Practically every activity of the Society has a purpose and a function pointing toward conservation education. The school program, however, is by far the most extensive part of its program, and therefore it will receive the most attention in this thesis.

Equally important, but not as inclusive or intensive with reference to the population reached, are the other youth and adult services. Therefore, although the visual aids, free material, Audubon Junior Clubs, natural history day camps, camp visits, recreation group work, youth lecture series, sanctuaries, adult lectures, staff lectures, courses at Audubon House, bus trips, camp-outs, adult workshop, publications and library will receive less emphasis, their definite value will be pointed out.

The school program, then, is to receive the major attention in this thesis.

JUSTIFICATION

How many people are conscious of the deplorable state of our nation's resources? Our populace is much too complacent concerning this problem, and too few are participating in its solution.

The writer is conscious of the problem partly through extensive reading on the subject, principally through attendance at the Rhode Island Conservation Workshop at East Greenwich, Rhode Island for three sessions (1944, 1945, 1946), Audubon Camp, Medomak, Maine, 1947, as well as by personal contacts, both correspondence and interview, with many experts in the field of conservation.

The writer has attempted to do something for the conservation of natural resources in her capacity as a member of the educational staff of The Massachusetts Audubon

Society for three years, (1946-1949); by leading a Girl Scout troop for six years; by counseloring at Girl Scout camp for three years; by directing a natural science day camp for one summer; by teaching on the staff of an adult summer science workshop; and, by lecturing before adult groups.

RESTATEMENT OF THE PROBLEM

The purpose of this thesis is to describe the activities of The Massachusetts Audubon Society in conservation education. It is hoped that this thesis will create in its readers a greater appreciation for the need of conservation, and inspire them to engage in a classroom activity, an extra-curricula activity, or preferably both, toward this end.

Using The Massachusetts Audubon Society's philosophy of natural science and conservation teaching as a pattern, it is the author's desire that more and more teachers and youth leaders will include in their programs education in conservation of natural resources. This type of a learning experience has the added advantage of contributing both enjoyment and healthful recreation.

CHAPTER II

THE NEED FOR CONSERVATION EDUCATION

Before discussing the need for conservation education, it seems wise first to define the meaning of the word itself. It might mean at first glance, preservation, but that would mean to leave things in a natural state without disturbing or using them at all. Certainly it would be economically unsound if we did not touch the fish in the sea or the timber in the forest.

Nature endowed humans with a bounty of good things to be used. To be used, yes, but not to be abused or used up carelessly and completely. CAREFUL, INTELLIGENT, WISE USE OF NATURAL RESOURCES is the definition of CONSERVATION.

Natural resources can be divided into two broad categories: replenishable and non-replenishable resources. The non-replenishable are coal, oil, metals, minerals, and the like, which when gone, are gone forever. The replenishable resources are forests, wildlife, soil and water. These are the ones with which The Massachusetts Audubon Society and the author are most concerned, because we can begin to conserve them in our lifetime for the benefit of our descendants.

When the Pilgrim Fathers reached our Massachusetts shores

over 300 years ago there was a bountiful supply of food in the ocean and forests in the way of wildlife, fish, mollusks, crustaceans, berries, nuts and herbs. The Indians had already been living for centuries on this naturally supplied food and consequently found it necessary to do a minimum of farming. The Indians did not know flood, or soil erosion. They were true conservationists. They gathered only what they needed and kept waste at a minimum.

As the white population increased and spread westward, men, drunk with their new political freedom as well as with the apparent freedom of the forests, the streams, the soil and all the creatures therein, used what was needed to feed, clothe and house their families. But they went a step further. It became a sport and hobby to hunt and fish and even sometimes to burn woodlands unnecessarily. In the mid-nineteenth century the pioneers traveling across the Great Plains would take a tally at the end of the day to see which man had killed the largest number of buffalo.

Toward the end of the nineteenth century, passenger pigeon meat was served as a part of the bill of fare at leading hotels, while the feathers adorned ladies' hats. Egret plumes, too, were the fashion. This was the era of the market gunner and the professional egger, who had complete disregard for allowing the birds an ample nesting season for sustaining the population of their species. By 1914, the last passenger pigeon died, and the egret population was at a very

low ebb.

When the farmland wore out due to erosion which in turn was due to poor management, the farmer and his family simply abandoned their home and moved on toward the west where there was more land to abuse.

President Theodore Roosevelt was the first President to attempt the introduction of conservation measures in this country. The effects of his efforts were just beginning to be felt when the first World War necessitated the overcutting of forests, the over-grazing of pasture lands, and the forced-farming of many areas unsuited for agriculture.

When forested lands are denuded, pastures are over-grazed, and plowed farmland is abandoned, the raindrop goes to work damaging the topsoil. The topsoil of this country, which is, on the average, six inches deep, took centuries to build up. But when the raindrops begin to wash the topsoil away, it goes quickly. Two billion tons of topsoil are washed off the surface of the United States each year. This means reduced crop yield, poorer quality of the food produced, muddy rivers, silted dams, fewer fish in the rivers, lower water table, drought, dust bowl, and gullies which "eat up" farm land. It is a vicious circle. With the earth's population increasing, and the amount of tillable land decreasing, there is indeed an immediate need for conservation.

The young people of today never have and never will see a passenger pigeon, a heath hen, a Carolina parakeet or a

great auk. These birds have become extinct within the lifetime of our parents. It is a sad admission that the dearth of many of these natural resources is due to both the carelessness and ignorance of our ancestors. It is hoped that the present generation will not be responsible in the near future for the extinction of such birds as for example the golden plover, the woodcock, the pileated woodpecker, the wood duck and the Hudsonian curlew. If, however, there is a continued destruction of the habitat of these birds, the present generation will be responsible for their total destruction.

Robert Cushman Murphy[1] says

> The broad significance of conservation should, therefore, be made part of the awareness of everyone in daily, workaday life. American children must learn the relations between climate, soil, and correct use of the land, because the laws that bind these together cannot be broken with impunity. They must come to see that the more we can keep, the more we shall have; that nature is most vigorous and rewarding when as many as possible of its elements are left in their primeval relation, with the eaters as well as the eaten recognized as desirable parts of the whole.
>
> So the moral is clear. For the sake of ourselves and our descendants, we must now all set about repairing the mistakes of our ancestors. In view of the goodly heritage they left us in most respects, the task will be a grateful one.

We have seen in the previous paragraphs something of the problem as it exists. But what has been done about it and

---

1 Robert Cushman Murphy. The Audubon Teachers Guide, edited by Dorothy A. Treat. National Audubon Society, New York, 1946, pp. 6-7

what can be done? During the first decade of the twentieth century, the Nature Study movement was gaining prominence under the leadership of Anna Botsford Comstock.

Mrs. Comstock's[1] book, Handbook of Nature Study, first published in 1911, certainly deserves a compliment as a step in the right direction, but its objectives of "simple observations" did not go far enough.

Another movement a few years after the turn of the century was fostered by a[2]

> mere handful of enlightened citizens...who deplored these depletions of wildlife resources. They started a campaign of 'protection'. 'Protection' was accomplished by legislation...The campaign was completely successful in the legislative sense.

So spoke Ludlow Griscom at the golden anniversary luncheon of The Massachusetts Audubon Society, February 19, 1946, at Boston.

This movement, too, was a step in the right direction, as it did save several species of birds from the precipice of destruction, but, as Mr. Griscom intimates, it was not conservation as we need it today.

Harold L. Madison[3], Co-founder and Director of Rhode Island's Conservation Workshop for the past six years tells

1 Anna Botsford Comstock. Handbook of Nature Study. Comstock Publishing Company, Ithaca, New York, 1947

2 Ludlow Griscom. Fifty Years of Conservation. Bulletin, Massachusetts Audubon Society. Vol. XXX, no. 3, April, 1946

3 Harold L. Madison. Conservation Education. Bulletin, National Council of State Garden Clubs, Incorporated. Vol. XVII, no. 12, December 1946-January 1947. p. 18

us that

> Nature Study is limited in scope, appealing as it does to man's sense of beauty and wonder. Conservation education on the other hand is far sighted and broad in its concepts for it deals not only with nature but with its relationship to man's economy.

In today's civilization, conservation must become a way of life. It must not be limited to a certain age bracket or to a particular occupational field, or to an individual socio-economic strata. It must become a part of the life of us all.

How can it start? The school is the logical place. However, since the teacher needs some background to be able to teach conservation, teachers colleges, specifically, and all colleges in general, should initiate courses on this subject.

Some private organizations have instituted summer courses, usually of two weeks' duration. For example, The Rhode Island Wildlife Federation sponsors the Rhode Island Conservation Workshop; The National Audubon Society operates Audubon Camp at Medomak, Maine, Greenwich, Conn., and new sites in Texas and California; and, in 1948 The Massachusetts Audubon Society initiated its Natural Science Workshop. These courses are attended by teachers, youth leaders, garden club members and nature hobbyists.

In January, 1947, Fairfield Osborn[1], author of the recent

1 Fairfield Osborn Urges Conservation Education. Bulletin, Massachusetts Audubon Society, Vol. XXXI, no. 2, March, 1947. p. 87

book, Our Plundered Planet, and President of the New York Zoological Society, stated:

> It is an extraordinary thing that in not one university or school in this country is the teaching of that basic thing; there might be a better word for it than 'conservation', but the understanding of the human enterprise with the living natural resources of the earth in no place is being intergrated with all the curricula. It belongs in history, chemistry, biology, engineering, and put in philosophy for good measure.

It is good to be able to report that since the time of this address, Cornell University has instituted a course in Conservation.

Mr. Madison[1] has similar feelings, as he states in an interview published in The Providence Sunday Journal of November 16, 1947:

> Conservation education for school children must begin in the teachers' colleges, with practical demonstrations and field trips substituted for lecture courses.

Elsewhere in the same article Mr. Madison indicates that[2] "Conservation cannot be taught as a separate subject" and recommends three methods of weaving it into other studies, namely:

1. the opportunity method
2. correlation of planned conservation teaching with another subject
3. projects

He concludes the interview by saying:[3]

---

1 Harold L. Madison. Conservation Lessons in Classrooms Urged. The Providence Sunday Journal. November 16, 1947

2 loc. cit.

3 loc. cit.

> The ultimate goal of this type of education is to foster Conservation in children as a concept, such as honesty and fair play are fostered as concepts. Then it would become a natural, spontaneous part of their thought and actions, and considerate treatment of our resources would be an established habit.

The National Wildlife Federation does a great service to the people of this country not only by its publication of pamphlets and books, but also by actively supporting helpful or opposing harmful federal legislation pertaining to the conservation of natural resources. The organization is to be complimented on its publication, The Foundations of Conservation Education. In this book, Paul B. Sears[1], of Oberlin College, and author of Deserts on the March, gives us some food for thought in the following paragraphs:

> Conservation cannot be developed piecemeal...Scientific intelligence must be used to satisfy the needs of man, while maintaining the balance of living nature.
>
> All of this means much change in the way we do things. Our first thought then is to pass laws, making people change their ways. But this is never enough, for laws without the public will behind them are dead. The next thought is to teach better ways in the schools. But children are like grown-ups - they understand what others do better than what others are saying. Unless the grown-up world shows itself willing to practice conservation, the practice will be hard for the younger generation to adopt.
>
> The only hopeful approach is one along all lines, laws, education, example, and particularly information to the world of adults. For conservation is really an attitude toward life and a way of living.

1 Paul B. Sears. The A B C of Conservation. Foundations of Conservation Education. National Wildlife Federation, Washington, D.C. 1943. Chap. III, p. 43-49

> The Justification of conservation is that it will make for better living for more people for a longer time.
>
> As to the schools, remember that they can teach only things upon which the adult world is agreed. Do not make the mistake of compelling the 'subject' of conservation to be taught. Instead, see to it that its teachers are included in the adult world of your community and made aware of its problems. Conservation will then be taught along with every subject.

The thought sometimes comes to the average city-dweller's mind as to why he should have any concern in the problem of conservation. His all too prevalent attitude is that it is the problem of the farmer, since he is the one closest to the soil, the forests and wildlife. If the city-dweller would reflect for a minute and realize that his very life depends on the food that the farmer produces, perhaps his attitude would be different. Economists agree that the standard of living of the peoples of the earth is determined by the quality of a nation's soil.

When the farmer is not practicing proper conservation methods, maximum yield from his land is impossible, which necessitates higher prices. If the land is worn out, as the quality of the soil decreases, the nutritive value of the food produced decreases, which is reflected in the health of the consumer. This applies not only to fruits and vegetables, but also to milk.

The author's experience with Settlement House children substantiates the fact that many underprivileged youngsters have absolutely no conception of the origin of milk, eggs,

apples or potatoes. There are many city children who do not know the origin of milk other than a bottle or a can. Many city adults are not much farther advanced in their information than these children.

This type of citizen does not have a conservation attitude. How can he realize the importance of little everyday economies, such as not letting a faucet drip; remembering to extinguish electric lights when they are not in use; to make hash of left-over food, rather than to throw it away; to prevent rainwater from washing away the soil around the waterspout?

It is unfortunate that so few people have an interest in this important need for developing an adequate conservation attitude. Teachers in particular are the most eligible recruits. On the other hand, those faithful few who are on the alert to the current conservation problems are to be deeply congratulated for rendering such service to the majority. Among them are organizations such as The Massachusetts Audubon Society, The National Audubon Society, The National Wildlife Federation, Garden Clubs of America, Friends of the Land, and others, all private organizations composed of interested citizens. These are the groups who sponsor legislation when it is needed and fight against bad legislation when necessary. Groups like these have fought hard to obtain proper game laws; to secure wildlife refuges and to sustain them; to prevent "land grab" racketeers from acquiring large

tracts of National Park land to be exploited for private use. If more people had an interest in this field, then their concern would lead to a desire for knowledge and consequently there would be more people working for the good of all. But when the average citizen is ignorant of what is going on, he cannot know when to write to his Congressman. The person with a conservation attitude is a good citizen, and contributes to the maintainance of our present standard of civilization.

Those who do not appreciate the full importance of the necessity of immediate conservation practices have not studied enough history. Civilization has hinged a great deal on soil conservation, but even the historians themselves are perhaps not fully conscious of this fact. Where early civilization once thrived, Babylonia, Chaldea, Assyria and Persia, the land is now waste and barren. The remains of such cities as Tyre, Sidon, Troy, and Carthage are found buried under a blanket of silt and sand so deep as to make the exact location of the cities uncertain.

If we theorize on the evidence these cities present, we can assume that the hills surrounding the city were denuded of their timber for fuel and for the building of homes and ships. Erosion became so intense that the farmlands were virtually smothered with silt or washed away in flood. Gradually, these centers of population began to have less food. As the health of the nation declined, famine and plague took their toll. Fewer able-bodied men to defend the land and so

many ill people in the city made it an easy target for stronger invading armies from other nations. The pillaged city left in ruin was eventually covered by the results of wind erosion as well as by water erosion.

In a later period of ancient history, Antioch, founded in a good situation on the Orontes River, flourished during Biblical times because it had good soil and was in an excellent location for the pursuit of commerce. According to Dr. W. W. Reitz[1]:

> Later, under Turkish domination, it declined rapidly because the youth were drafted for the armies, the soils were exploited, the forests were stripped, rivers and canals were allowed to silt up, while the rural populations were reduced to peasantry and forced to live in hovels. Antioch is a city of the past.
>
> China is now in an active stage of decline due to ignorance and neglect in regard to the conservation of her natural resources. Probably no country in the history of the earth was so blessed with fertile soil and vegetative possibilities as China. A very large proportion of her area consisted of loessial soil unsurpassed in depth and fertility. Her enormous population through centuries of time is evidence of this natural gift. Most of this wealth has been squandered and is now useless, since it lies in the ocean's depth outside of China's shoreline.

It may be said that this catastrophe to civilization could not happen here in the United States. But it could, and will, if more work is not done soon. The fact that the Mississippi delta builds up so much each year is proof that the farms along its banks and its tributaries' banks are

1 William W. Reitz. Soil Erosion and World History. Teaching Aid No. III, December 1944, United States Dept. of Agriculture, Soil Conservation Service, Upper Darby, Pa.

losing their valuable topsoil. It might be assumed that "modern methods" will save the nation's economy, and they will if there is a proper balance between so-called modern methods and nature's own way of doing things. The methods of land use which will save the soil as advised by the Soil Conservation Service are such practices as contour plowing, strip cropping, terracing, drainage ditches, crop rotation, and check dams.

Edward H. Faulkner[1], in his book, Plowman's Folly, claims that modern farm machinery is causing the downfall of our farmlands. He prefers not to plow at all, but he does agree to some harrowing. Faulkner's idea is that green manure and mulch best imitate nature's method of building up duff which leads to humus. He has tried his method on his own farm for a number of years and has succeeded in obtaining increased yield. Perhaps the value in his method will be proved fully in the future.

The State of Wisconsin issues to its teachers manuals of teaching aids and suggestions for conservation education. In one of these manuals, John Callahan[2], State Superintendent, says:

> To this end, it is not only our patriotic duty to see that these future citizens have the best possible preparation for their task, but it is also our duty to see that we

1 Edward H. Faulkner. Plowman's Folly. Grosset and Dunlap, New York, 1943

2 John Callahan. Helps in Teaching Conservation in Wisconsin Schools. Dept. of Public Instruction Curriculum Bulletin, Vol. 1, No. 2, May, 1938

> do all in our power to hand on to them as good a heritage as we can. This means that conservation must not only be taught, but it must be practiced by the present generation.

In another Wisconsin manual[1], which contains an annotated bibliography, lesson plan suggestions, lists of available books, slides, movies, and is well illustrated, appears the statement:

> While man's past stewardship of our natural resources reveals very few lessons for us, the present is replete with promise for better homes and richer living. This is the opportune time for the school to do its full part. Real challenges rest with the teacher training institutions of the state, and with superintendents, supervisors, and principals of our schools. With the teacher training institutions of the state rests the responsibility of giving conservation guidance not only to prospective teachers, but to the hundreds of experienced teachers who turn to these institutions during summer sessions for inspiration and help.

In his new book, Ward P. Beard[2] stresses the economic and social significance of conservation. He says that:

> Without conservation profitable production dwindles to subsistance. Subsistance with poor food, clothing and shelter bring on ill health, indolence, discouragement, poor schools, churches and low moral standards. The spiral descent has a momentum so great that without help from other sources nature closes the books with the last inhabitant of such areas.

Mr. Beard[3] suggests several methods for the inclusion of conservation education in the school curricula.

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1 Helps in Planning Conservation Learning Experiences. Dept. of Public Instruction Curriculum Bulletin, Vol. I, No. 3 July, 1943

2 Ward P. Beard, Teaching Conservation. The American Forestry Association, 1948. p. 28

3 Ibid. p. 39

Plan 1. A separate course in conservation; either required or elective.
  a. Taught by a specially trained teacher.
  b. Taught cooperatively by several teachers.
Plan 2. Instruction through a core curriculum, concepts taught in a variety of units, not as separate units on conservation.
Plan 3. Conservation units in standard subjects or courses.
Plan 4. Conservation taught incidentally in standard subjects or courses.

Another educator who sees the need for conservation education is W. C. Croxton[1], who says:

> Stream pollution has become a great public menace. The change of water levels has affected the welfare of numerous forms of wildlife and countless people. There remains but a small area of the valuable forests of the country, while fires have increased until there is no adequate reproduction. The progress of what we have called civilization has left few natural remnents of primitive America...We lament the depletion of many kinds of wildflowers, yet few people (including teachers) know what species their states are attempting to protect, and fewer still are able to recognize them....Attempts to remedy these conditions and to institute forward-looking policies are meeting with very limited success with a public not trained to utilize knowledge for social action. ...Nothing short of a program throughout the schools directed toward this end can hope to accomplish this important objective. While scientific research must remain impersonal, public school education in science, as in all other subjects, must be directed toward social ends.

It is readily noted, then, that the majority of those interested in conservation recognize the value of its being taught in the schools by trained teachers. The question of where the teachers will get this training is a dilemma to conscientious educators. College biology courses are not

1 W. C. Croxton. Science in the Elementary School. McGraw-Hill Book Company, Inc., New York. 1937. p. 46-47

adequate preparation for conservation teaching. As has already been mentioned, the summer workshop session and a specific college course in conservation are in a large measure the solution to the training problem. The program of The Massachusetts Audubon Society, which will be discussed at length in the following chapter, will show how this unique type of teaching-demonstration work carried on by its staff is working so well in the schools of the Commonwealth.

CHAPTER III

THE MASSACHUSETTS AUDUBON SOCIETY

A. EARLY HISTORY

In order to appreciate fully the philosophy of The Massachusetts Audubon Society, it seems appropriate to outline briefly its early history, since it was originated for the sole purpose of conservation.

It was pointed out in the previous chapter that the last decade of the nineteenth century was the period when market gunning and professional egging were at their height. This was the major objective and the chief stimulus for the conception of the Society.[1]

> The first informal meeting of the Board of Directors took place at the residence of Mrs. Augustus Hemenway, 273 Clarendon Street, Boston, on Monday, February 10, 1896, with eight people present. Nine days later, a more formal meeting was held at the home of Mrs. Arthur T. Cabot at 3 Marlborough Street, Boston. At these meetings, leaflets, by-laws, committees, local secretaries, etc., were discussed and arranged for, and the work of the Society was fairly launched. One of the purposes of the Society, as stated in the first paragraph of its first circular, was to discourage the buying and wearing of the feathers of any wild birds.

The Society adopted the name of John James Audubon because he was one of the first, if not the first, to realize the need

1 Winthrop Packard. The Story of the Audubon Society. Bulletin, The Massachusetts Audubon Society. Vol. V, No. 8, December 1921. p. 3-9

for wildlife protection. This great naturalist and painter of birds in their habitats, also wrote of the terrible waste and wanton destruction of our bird and mammal life which was occurring in the early decades of the nineteenth century. The name of Audubon was certainly a fitting one for a conservation-minded organization.

During the second year of the Society's existence, it was voted to devise and print the first bird chart. Ralph Hoffman, who originated the idea, was a member of the Board of Directors, a lecturer on birds and the author of a Bird Guide. Two charts were made, each containing in color the pictures of Twenty-six Common Birds on a 27x42 inch linen mounting. Later, two more charts, namely Twenty Winter Birds and Twenty-three Migrants were published. These wall charts are still available at the Society headquarters.

Two of the very early educational activities of the Society was the publication of an Audubon Calendar, and an Audubon Poster to be used for posting one's land against hunting. These activities are still in operation today, with several thousand being distributed each year on a country-wide basis.

[1]Another early activity was the devising of a circular advocating Bird Day in the public schools. This was published in the Journal of Education and reprints were circulated among superintendents, teachers, and

1 Winthrop Packard. The Story of the Audubon Society. Bulletin, The Massachusetts Audubon Society. Vol. V, No. 8, December 1921. p. 3-9

> and others. In response to this first circular, eighteen gratifying letters were received saying that Bird Day had been or was to be observed in the schools. Through persistent influence thus originated, Bird Day has since become an established institution in the state, fostered and provided for by the Commonwealth itself.

Bird Day is still an important activity on the Massachusetts Audubon Society's calendar of events. On an announced day in May, when the warbler season is at its height, walks are scheduled in about sixty-five cities and towns of the Commonwealth.

A long list of distinguished people made up the first Board of Directors and officers, with William Brewster as president. Of this list, Mrs. Augustus Hemenway and Miss Mina B. Hall are still living at the present time.

William Brewster retained the office of president until 1913. He was succeeded by Edward Howe Forbush, State Ornithologist, who filled that position until his death in 1926. At that time, Robert Walcott became president, in which office he still serves.

Miss Harriet E. Richards, of Brookline, was the Society's first Secretary-Treasurer, and also served as lecturer, demonstrator, and field organizer.

In 1903 when Miss Richards resigned because of poor health, Miss Jessie E. Kimball succeeded to the position of Secretary-treasurer. Winthrop Packard took over this position in 1913. His twenty-four years of service to the Society saw it expand beyond the expectations of the early members.

Under his direct leadership, fifty members of the Society each summer had the unusual opportunity of spending two weeks together at "Bird Camp". The initial undertaking of this project was during the first two weeks of July, 1926, when the group sailed from Boston to "Echo Lake", in the Lafayette National Park, Mount Desert Island, Maine. Both land and water birding were enjoyed.

Records indicate that this excursion was an extremely successful and profitable experience for those attending.

The facilities of Echo Lake were used for six years. For some unrecorded reason, no Bird Camp was held during 1932.

In July 1933 a new location for the camp was available at Cape Rosier Camp, Penobscot Bay, Maine, where trips were scheduled for four summers. Opportunity for attending the Bird Camp was discontinued upon the retirement of Mr. Packard in 1936.

During his secretaryship, Mr. Packard's keen insight into the need for conservation education was evidenced by the fact that a Mr. L. Raymond Talbot was engaged in November, 1929, as an educational field agent. Mr. Talbot visited schools, boys' clubs, Scout and nature organizations to give talks and illustrated lectures, to lead bird walks, to organize bird and nature clubs, and to enlist the interest and enthusiasm of young and old in the work for conservation. In this capacity Mr. Talbot was actually the forerunner of the present Massachusetts Audubon Society's extensive educational program.

In February, 1930, Mrs. Harriet Upham Goode joined the staff as an Audubon Junior Club promotor. She conducted numerous school assembly programs and also presented programs for smaller groups.

Mr. Carl W. Buchheister became the secretary-treasurer in October, 1936, and the Society continued to expand. During his leadership, the first all day chartered bus trip to Plum Island in Essex County was held on Sunday, January 24, 1937. Favorable response to this bus trip prompted the planning of another trip in May of that year. In 1938 trips were again held in January and May, but the next year, an autumn trip was added. This schedule continued until the war, when the federal ruling curtailing bus transportation necessitated the use of train service. Under these conditions, beginning in January, 1943, the group took a train to Newburyport and walked along the beaches there, while some more ardent birders even walked to Plum Island. The train trips were scheduled on a monthly basis. In November, 1945, when bus transportation returned to normal, chartered bus trips again were scheduled and are now a regular monthly activity, except during June and July.

In the Fall of 1939 Mr. Buchheister resigned from the office of secretary to take a position with the National Audubon Society in New York. Mr. C. Russell Mason filled this vacancy in November of that year.

Under Mr. Mason's direction the Society's membership has

increased to almost eight thousand. The educational program in particular has expanded to its present grand scale.

With the groundwork, so to speak, already laid by Mr. Talbot and Mrs. Goode, the school superintendent of Hamilton-Wenham-Topsfield requested that bi-weekly lessons in nature lore and conservation be given in the elementary grades of his schools. So, in 1939, after securing financial support for such a program, a part-time teacher was employed to fill this assignment.

The news of the success of this experiment soon spread to the other towns in Essex County and consequently in the Fall of 1940 another teacher was engaged. By the end of 1942, fifty classes were being conducted in thirty-nine schools in twenty-five Massachusetts towns.

The growth of interest in this educational program of the Society has been almost phenomenal. At the present time (1949) there are ten full-time and five part-time teachers (including two Sanctuary Superintendents and one Museum Curator of Science) on the educational staff of the Society who conduct approximately three hundred weekly or bi-weekly classes in eighty-three cities and towns of the Commonwealth.

Promoting good conservation legislation is another facet for the ambitions of the Society. Starting with its campaign to stop market gunning and plume hunting, the Society has through the years done a great deal toward helping to secure the Migratory Bird Act, fighting anti-pollution legislation

and in the past two years has fought hard, and successfully, for the retention of the Parker River Wildlife Refuge.

When the Society first organized, deskroom was provided for the secretary in the library of the New England Museum of Natural History on Berkeley Street. After twenty years, when more room was necessary, a large room was rented in the basement of the Museum. By December, 1943, however, a great deal more space was necessary, and the Society was very fortunate in being able to purchase and move into the three story building at 155 Newbury Street, its present headquarters.

This building houses the attractive library and sales department, the various departmental offices, and the Smith room.

The Smith room was dedicated to the memory of Francis Smith for the use of children or adult groups which arrange to come to the Society's headquarters for a program. Other groups which regularly avail themselves of the facilities for monthly meetings are the Massachusetts Conservation Council, The Old Colony Bird Club, and The Malacological Club.

So it was that the Society was founded for the purposes of conservation and education.

The Massachusetts Audubon Society has often been referred to as the "mother" of all Audubon Societies, for directly through its example and influence, similar societies were formed one after another in nearly every state in the country.

In the future pages of this thesis the present day program to meet these objectives will be discussed fully.

B. THE SCHOOL PROGRAM

From the small beginning of three classes of natural science in Essex County in 1939, the school program in Conservation and Nature Lore of the Massachusetts Audubon Society has grown to its present number of approximately three hundred classes, distributed throughout the state. The lessons are taught chiefly in the fifth and sixth grades, but in some school systems, particularly where several grades are in one room, the second through seventh grades receive the course. The Audubon teacher visits the class every two weeks and presents approximately an hour's lesson. A total of sixteen lessons are presented in the school year, ten of which are basic. The basic subjects are:

The Three Kingdoms
Fun with Birds
Christmas Greens
Insect Ways
Respect for Reptiles
Save the Soil
Winged Predators
Winter Birds
Meet the Wildflowers
Water Life: Marine or Pond and Stream

Giants of the Plant World

Balance of Nature

Additional subjects, according to the children's and classroom teacher's desires as well as school environment, are chosen from the following list:

The Might Weaver

Seeds

Be Weather-wise

The Earth's Neighbors

The Earth's Diary

Furred Animals

Bird Structure

Living Out Of Doors

A Discovery Trip

Spring Birds

Flower Structure

Animals in Winter

Partners and Parasites

Animal Homes and Habitats

From Dinosaur to Diamondback

At the present time, the fee for this service is one hundred dollars per year for each class visited by the Audubon teacher. In most cases, this fee is paid outright by the town school department, but in many cases, interested groups such as Garden Clubs or the Parent-Teachers Associations help to sponsor the program. It is also supported

financially by the New England Wildflower Society and the Massachusetts Conservation Council.

The teaching staff of the Society has increased from its original one, who pioneered the work, to the current total of fifteen. Nine of these do the work of the Boston area, Essex County, the South Shore, Martha's Vineyard and Nantucket; one has the full responsibility of the Worcester schools; two work in the schools of the Connecticut Valley; and, three work in Berkshire County. There are eighty-three cities and towns benefiting by the program.

Naturally, the Society would like to see conservation education work carried on in every grade in every school, in every city and town of the Commonwealth. But this would be an impossibility both financially and physically for a private organization to undertake. So, the Society's underlying objective in inaugurating its program is one of demonstration teaching. In this way, an attempt is made to achieve two goals: to convince the public authorities that throughout the state the schools themselves should give such courses; and, to demonstrate to the classroom teacher various methods of presentation of natural history subjects, which at the same time prove educational to her and the children.

A few school systems have already discontinued the Society's schedule because they feel that their teachers have benefited so much from the observation of these lessons that they can carry on a similar program without the immediate

help of an Audubon instructor.

For his work with the children in the classroom the Audubon teacher's objectives are these:

1. To acquaint the children with natural resources.
2. To develop in children a desire to use natural resources intelligently, and to give them an understanding of the true meaning of "conservation".
3. To show how wildlife, soil, forests and water-supply depend on each other, and how man depends on them.
4. To develop in children the ability to observe carefully, to think critically, and to be open-minded toward the fundamental scientific facts concerning not only natural resources, but all phases of science.
5. To teach respect for and appreciation of the out-of-doors.
6. To analyze how the local, state and federal governments help to practice conservation, and how every person, as a good citizen, can live conservation by acquiring a conservation attitude.

For achieving these objectives, the Audubon teacher has three favorite techniques, namely:

1. Get the class out-of-doors.

2. Use of the senses: look, listen, feel, smell, taste; often emphasized by the use of games.
3. Use of live material.

When the Audubon program is first started in any school system, teachers and principals are usually slightly skeptical about allowing the pupils to leave the classroom. The children are the first to realize that an outdoor lesson really is for instruction, and not an extra recess period. They appreciate the opportunity to ask questions about all the things around them and to receive an accurate, logical answer. The excursion may be only to the backyard playground, but that is sufficiently alive with material to provide an interesting lesson. There usually will be a tree whose twigs, leaves, bark, and seeds can be studied. Insects climb its trunk and ant-holes are numerous in the playground sand. The few evergreen shrubs and the barberry bushes are exciting, too. The gully is there because the boys climb the bank and prevent the grass from getting a foot-hold, consequently erosion occurs. The very stones underfoot contain many interesting minerals. The schoolyard is not alive only at recess, but is a host to numerous living things at all times. The child is trained to see what is around him.

Naturally, the excursion to the nearby park, field, or wood-lot contains even more to be observed. Even in the city there is more material in the immediate environment than is ordinarily noticed by the average person.

Classes especially fortunate are those near to the Sanctuaries of the Audubon Society. Bus transportation conveys children in the vicinity of Sharon, Northampton and Lenox to the Moose Hill, Arcadia, and Pleasant Valley Sanctuaries, respectively, and there the best possible outdoor lessons are taught. An indoor lesson can tell of supplying bird feeding stations and bird nesting boxes, or of bird banding, but when the child actually sees these things being demonstrated, a more lasting impression is made. In the sections of the state where possible, Sanctuary visits are made in the Spring of the year, usually as a concluding lesson to serve as a resume of the whole conservation course. A picnic is usually in order, too, affording an opportunity to emphasize outdoor good manners.

Live material is used to as great an extent as is feasible. It is customary to bring live specimens to the classroom when teaching the amphibian, the reptile, and the mammal lessons. The insect lesson is usually taught in the out of door where the live specimen is caught by the child himself. Naturally, this is a huge asset to motivation, as the pupils have an opportunity to see and feel the animal. In this way, many superstitions or misconceptions the child may have had are usually abolished, as he remembers this experience for a long time. Obviously, the classroom teacher, since she may not be a specialist in natural history, is herself a pupil during these demonstrations.

The introductory lesson in the Fall is always, "The Three Kingdoms". At this time, the child is acquainted with what the field of natural history embraces, as well as its extent. The presentation of the lesson follows the natural paths of evolution so as to give the children an understanding of the order and organization of the world and the life in it. A reference sheet[1] accompanies this lesson. At first glance, many classroom teachers consider this reference too advanced for fifth or sixth grade pupils, but the feeling of the Audubon Society teaching staff is to aim high. The unfolding of the lesson, with its visual material, furthers the understanding of the information on the reference sheet at the very start. Then, too, this particular sheet is utilized in all future topics to see where the subject of the day fits into the total pattern of natural history. By the end of the year, therefore, it is safe to assume that all of the average children in the class understand this fundamental reference sheet.

One of the most interesting lessons from the Audubon teacher's point of view is the one on reptiles. The author has taught this lesson many times in the classroom, as well as at summer camps. It is one of the basic lessons required in the schedule of each Audubon teacher. Each instructor has his own method of presentation, but the goals and the ultimate results are similar in each case. The author initiates the

1 The Three Kingdoms. Reference sheet, see appendix.

lesson by writing the title on the blackboard, "Respect for Reptiles," and asking, "What is a reptile?" From previous lessons in the animal kingdom, the answer usually comes quickly from the class that it is a vertebrate, cold-blooded, and has dry scales. By consulting the reference sheet, which was distributed at the very first visit, another child will soon offer the four classes of reptiles: lizard, snake, alligator and crocodile, and turtle. Experience has shown that it is best to discuss lizards and alligators and crocodiles first because they are not native to New England and a few remarks concerning them is sufficient, permitting more time for the presentation of turtles and snakes.

The next step is to introduce the live turtle. It is ideal if a specimen of each of the most common New England turtles is available, because children (and the classroom teacher, too) usually think all turtles are just turtles. So, if possible, a painted, a snapping, a spotted, a box and a wood turtle are shown and compared. Using the question and answer method, the "shell", food, enemies, method of reproduction, habitat, and place in the balance of nature are discussed. The children are shown how to hold a turtle safely, and all who care to hold him are given the opportunity. Then the turtles are given the freedom of the room while the snakes are exhibited. The best snakes for demonstration are the green snake and the DeKay's snake, as they are both small even at maturity, and are very gentle. It is best to hold

them nonchalantly but carefully in the hand as they are discussed. Comparisons between the snakes and the turtles are readily made, because their physical characteristics are apparent. When the children are taught the eating habits of the snake, foundations are laid for realization of his importance. During the progress of the lesson the children have been observing the proper method of handling a snake. Soon it is time for the teacher to ask, "If you would care to hold the snakes, form a line, side by side, at the front of the room." In each of the fifty odd times that the author has followed this procedure, the results have been the same: practically everyone in the group clamors to be first in line. The few who remain seated do not remain seated for long, for when they see how much their classmates are enjoying the animals, they walk to the end of the line and eventually have their turn.

Naturally, some mention is made in the lesson of the poisonous snakes. In the Berkshire region, the teachers must emphasize identification of poisonous species as well as treatment should a bite be inflicted, because certain species of rattlesnakes do occur there. However, all the children are warned that a large water snake and a garter snake will bite, but that it is not any more dangerous or painful than a bramble scratch unless it becomes infected.

One intention of this lesson is to remove superstition and unwarranted fears from the children; another is to give

them an appreciation of our helpful reptiles. Instruction in conservation is thus accomplished.

The children are urged to collect some specimens and bring them into the schoolroom. They are told the proper way to house the animals while they are in captivity and most important of all, they are urged to keep them only a short time for the purpose of observation. To release them after a temporary period is good conservation.

If, in the mammal lesson, the Audubon teacher can bring with him a dog, a cat, a hamster, a white mouse, or some other species, certainly a more profitable learning experience is offered to the children.

After a lesson on amphibians[1], the children are urged to find and bring into the classroom a few eggs of toads and of frogs, so that they can witness the metamorphosis during the remainder of the school year. At the close of the term, the tadpoles to be returned to their pond home, so they may resume living in a natural environment.

Certain lessons do not lend themselves to the use of live material. For this purpose, the collection of material at Audubon House would be used for visual aids. In the case of seashore study this material may be used although a class in a school near the ocean would have a field trip for this lesson.

1 Reptiles and Amphibians. See appendix.

The most significant feature of the conifer lesson is training in the use of a key[1]. While far from complete, this key is adequate for use in investigating the native evergreen trees of Massachusetts neighborhoods. The skill acquired in using this simple basic key is easily applied by the child later in life in the use of more complex forms for the identification of insects, snakes, plants, and even birds' nests.

The conifer lesson is taught by the Audubon staff in December, when interest in Christmas greens is prominent. Therefore, a good opportunity is afforded to stress the importance of conservation of evergreens by teaching the types of plants which should or should not be used. The broad-leaved evergreens and lycopodia are in the category of plants not to be picked, while the needle-leaved evergreens may be cut within reasonable limits.

Depending on the environment surrounding the school, the children may be asked in advance to bring in twigs of conifers for this lesson. In some cases, this suggestion to the class works out well, but in most cases, the children collect the wrong specimens, too much of the same, or, they bring nothing at all. Through experience, then, the Audubon teacher has learned to bring to class with her a large number of samples. In this way, a good balance in varieties is assured, while no tree has been maltreated. This lesson always proves exciting

1 Be a Conifer Detective. See appendix

to the children because of its game quality. There is a certain amount of competition in seeing who succeeds in tracking down the longest list of specimens.

Naturally, since the Society is very much interested in the conservation of birds, the schedule of lessons contains three basic lessons on birds, and as many optional ones as the interest of a particular class determines. At all times, however, it is stressed that conservation of one family of the three kingdoms would be folly. Interdependence of all phases of natural history is the critical keynote.

The first lesson on birds is in the Fall, when, with approaching winter, they need help in securing food. The lesson usually begins with a discussion of the birds that migrate to the south of Massachusetts for the winter, and those that spend the winter here. The children are told what food to give the birds during the cold months and how to do it. Feeding stations at home and at school are encouraged. Many of the suggestions given at this point are results of experiments in methods of bird feeding carried on at the Massachusetts Audubon Society Sanctuaries.

Other basic bird lessons include the value of the Predators; hawks and owls; and winter birds. Optional lessons on migration and adaptation may be separate lessons, they may be combined with one another, or they may be included with the Spring bird lesson. The Spring bird lesson relies almost completely on visual and auditory aids. The Society's large

resource of Kodachrome slides serve the visual side, as the Cornell University recordings of bird songs supplies the auditory impulses while the slide is being projected on the screen. This, of course, is excellent preparation for the outdoor field work which comes a little later in the program.

It is easy for the youngster to identify birds when he knows what distinguishing marks to look for. He is also taught where to look; that is, he learns in what habitat he can expect to find a certain species. The marsh, field and forest each have their own distinct bird life. The when is important, too. Knowing which birds are present in the various seasons of the year is an aid to identification as well as to conservation. To know what birds are common to a region is helpful, too. For example, two of the most frequent mistakes the children make in reporting their records to the Audubon teacher are the red-headed woodpecker and the cardinal. When this happens, the Audubon teacher proceeds to explain that the red-headed woodpecker is very seldom seen in Massachusetts and that the cardinal is an extremely rare visitor. What the child probably saw was the downy or hairy woodpecker instead of the red-headed, and the male scarlet tanager instead of the cardinal. The Audubon teacher strives to emphasize the importance of careful, accurate observation on the part of the youthful reporter. However, once in a great while, an alert youngster who is keen in his powers of observation, may stumble across some

rare visitor. The children must not be unrecognized in such instances. As soon as possible the report will be checked by several experts and judgment made as to the accuracy of the identification.

The educational implications of such training has its value in making the child aware of his environment. When he knows what is around him, he will be better able to use it, appreciate it, and live in it. It is training, too, in the use of the scientific method. That is, observing carefully the evidence presented, and thinking out the answer.

For the lesson on Spring wildflowers, the Audubon teacher again draws on the Society's large collection of Kodachrome slides. In city schools where a field trip would not produce any of the living specimens of common wildflowers, the showing of the slides consumes the greater part of the lesson. Each slide, of course, is accompanied by a discussion of the plant being shown: its habitat, its growth stages, and its relative abundance or rareness. Naturally, wherever a field trip is feasible to see these plants growing in their natural setting, the slides serve only as an introduction to the field trip, or to show specimens which are not in the immediate vicinity. This lesson is perhaps the best one in which to drive home the value of the Society's teaching motto: "Learn to enjoy, not to destroy." And certainly the habit of "looking without picking" is urged here.

A very important lesson in the year's plan of work is on

the balance of nature. Taught at the end of the year, it is concerned with food chains and the interrelationship of all members of the three kingdoms. At this point in the course the children are able to understand the niche which each type of flora and fauna occupies and consequently are able to comprehend the folly of bounties and other unwise game laws.

As a visual aid in teaching this lesson on the balance of nature, the members of the educational staff quite often take advantage of Ding Darling's black and white cartoon film, Once Upon a Time. This 16 mm. silent film is narrated by the teacher to supplement its graphically depicted implications on the necessity for conservation of all natural resources.

Sharp Eyes and A Real Mother Goose both photographed in color by Jack Van Couvering, are two films also in the educational film library which the Audubon teacher frequently uses in connection with his lessons.

As has been mentioned previously, each member of the Audubon educational staff teaches these lessons in his own way, but the final analysis is about the same. So that there will be similarity in content and overall objectives, the complete staff has two conferences a year. In December, the conference is held in the Boston office, 155 Newbury Street, during Christmas school holidays. In June, when the teaching in the schools is completed, the staff confers on Mt. Greylock.

These conferences serve the purpose of having the teachers in the various parts of the state get together to talk over

their common goals, achievements, and problems. It is an opportunity to keep abreast of the newest happenings in conservation on a nation-wide and state-wide scale. Methods of teaching are discussed. Occasionally, an expert in one of the natural science fields, but not on the Audubon staff, is invited to attend so that the staff members' horizons may be broadened.

The meeting on Greylock in June serves the additional purpose of allowing the staff to do field work together. While each member of the staff is an all-around naturalist, practically each member has a specialty. The expert on birds will exchange information with the botanist, and the herpetologist will gain knowledge from the entomologist.

Thus it is that the teachers keep up on their own knowledge of natural history as well as gaining from each other some novel method of lesson presentation.

It has always been agreed by Audubon teachers that the quantity and quality of their work is augmented or suppressed by the attitude of the classroom teacher in whose room he visits. While in the majority of cases the classroom teacher is receptive and cooperative, how much interest she has in doing the carry-over work suggested by the Audubon teacher is soon evidenced by the amount of integration she does.

With each lesson taught, the Audubon teacher leaves some sort of helpful, but of course optional, suggestions to be carried on during the two week period intervening between

lessons.

It is very easy to integrate the natural science and conservation lesson with practically every other lesson taught in the classroom. The biggest motivition for correlation of this sort is that the children love it. Some methods of integration are suggested here.

1. Integration With Reading and Literature
   a Many of the reading textbooks at the fifth and sixth grade level have a unit on one or more phases of natural science. The classroom teacher should assign such units, when available, as follow-up for the nature lesson.
   b There are numerous children's books on nature subjects. The children usually delight in using these books for extra-curricular reading and for book reports. The bibliography contains a suggested reading list.
   c Poetry abounds on subjects in nature. Beware of poetical license dispersing wrong information!
2. Integration With Geography
   Weather and climate, combined with topography and minerals, cause the environment of a region and thereby determine its use to mankind and consequently bears directly on his standard of living. The Audubon teachers' lessons on weather,

soil, and geology correlate very well with Geography.

3. Integration With Language
   a. Story-telling -- both written and oral expression is stimulated by the subject of a natural science lesson.
   b. Letter-writing -- to government agencies or private organizations for pamphlets, posters maps, films; thank-you note for a special lesson or field trip.
   c. Reference work -- to develop skill in using dictionary and encyclopedia to gain further information on some part of the natural science and conservation lesson; use of information gained; organization of ideas; outlining.
   d. Spelling and vocabulary -- carry over of the new, specialized words introduced in the natural science lesson into the spelling lesson will help these words become an integral part of the child's vocabulary.
4. Integration With Manual Arts
   a. Illustration of the same phase of the natural science lesson.
   b. Quick sketches of live material
   c. Poster making - "Prevent Forest Fires."

d. Large bulletin board projects.

e. Construction of habitat groups.

f. Building bird houses and feeders.

g. Constructing an electric bird identification game.

h. Clay modelling of animals.

i. Arranging exhibits on an "interest table".

j. Keeping attractive notebooks.

For several years, it was customary for the Audubon teacher to leave for each child a worksheet pertaining to the lesson to be done in the intervening two-week period. It was a combination review test and activity suggestion sheet. It usually contained a variety of multiple choice, fill-in, or true-false statements, as well as suggestions for integration and references.

It was discovered, however, that these sheets were occassionally either not done at all by the children, or that if done, they contained errors. It was not considered within the province of the Audubon teacher to correct these work sheets, nor was there time in his class period for the children to do them under his supervision. Then, too, one of the purposes of the worksheet was to supply the classroom teacher with a basis for a review lesson on the odd week when the Audubon teacher's visit was not due. Therefore, rather than have misconceptions, or uncorrected errors in the worksheet notebook, it was decided at one of the Audubon Teachers'

Conferences to limit the use of this type of worksheet.

Lack of time, due to the pressure of other activities, seemed to be the chief reason given by the classroom teacher for the fact that these worksheets were not always properly administered. It was not due to lack of enthusiasm or interest on the part of either the teacher or the class.

The type of sheet coming into use today is a reference sheet. It serves as an introduction to the lesson, a study guide, and an organized review. In the notebook, it serves as a ready reference to the subject it covers, and can be used by the student in future grade levels, and even in high school.

As was mentioned previously, The Three Kingdoms lesson is usually accompanied by such a reference sheet, and is used many times during the year.

The birth of these reference sheets is a cooperative effort on the part of the Audubon staff. The pooling of knowledge of those better versed in a particular phase of natural history, and the asking of questions by those less well versed causes the sheet to evolve.

Among the best of these reference sheets, in addition to The Three Kingdoms, Amphibians and Reptiles, and Be a Conifer Detective, already mentioned, are How Animals Spend the Winter, Common Orders of Insects, and Constructing a Terrarium. Copies of these sheets are in the Appendix.

In Pittsfield, the members of the Audubon Society staff cooperate with the Berkshire Museum staff in the presentation

of Saturday morning nature programs throughout the school year. This is done with the cooperation of the Pleasant Valley Sanctuary, the Sanctuary Director being on the Audubon staff as one of the teachers.

At the Peabody Museum in Salem a cooperative plan is in operation whereby the Audubon teacher for that area is also the Curator of Natural History, working a specified proportion of her time at the Museum.

The teachers in each area of the state are frequently called upon for duties other than teaching, such as lecturing to adult groups or giving the nature study portion of Girl Scout Leaders' Training Courses.

An additional testimony to the versatility of the Audubon teachers became apparent when, in the Spring of 1947, the educational division of radio station WBZ in Boston and the State Department of Education asked that a series of fifteen scripts on nature subjects be written for presentation during the summer. The Boston office educational staff of the Society undertook this project, and although they were inexperienced in the field of radio script writing, the scripts were changed very little by the professional staff writers at the radio station.

The series, geared primarily for children, was entitled Let's Go Exploring and in each weekly broadcast, the characters were depicted as enjoying and studying some phase of natural science, with emphasis, of course, on conservation.

How can the success of this natural science and conservation education program be judged? Some evaluative criteria might be: Is it educationally sound? Does it meet its own objectives? Does the child grow?

Yes, the program is educationally sound, because the lessons stress the use of direct observation, the best method of gaining first-hand information, to the greatest extent possible. Auditory, visual and kinesthetic teaching aids are used more by the Audubon teacher for his lesson than by the majority of classroom teachers for their general subject matter lessons. The classes used are the fifth and sixth grades primarily when the children are at the Boy Scout-Girl Scout and summer camp level, so that there is good opportunity for carry-over into their everyday living experiences outside of school as well as in the ease with which these lessons integrate with other classroom subjects.

How do we know that this conservation training will last over into adult life? No individual case histories are kept, it is true, but in many cases, youngsters who have had the program in the past still stop and chat with the Audubon teacher when he is in their school, and tell of new, interesting experiences in the out-of-doors. Many, too, communicate with the teachers at the Audubon office, to ask a question or to tell of a new project.

Does the program meet its own objectives? Naturally, it is hard to measure attitudes, and the primary objective of

the program is to teach conservation attitudes. But the way the children react to the program is certainly some indication as to their attitude. The children are always anxious when they see the Audubon teacher enter the room, and are just as reluctant to see him leave. They often ask, "Why don't you come every week?" "Why can't we have you next year, too?" "Are we going out-of-doors today?" "Do you have anything alive with you today?"

If tests for retention of content were given, we would have a measure of what the youngsters know. But by their physical and aesthetic reactions we can see how they feel. It is felt by the Audubon staff that these are sufficient criteria to indicate how well the children's gain will be sustained during adolescence and adulthood.

This also answers affirmatively the question, "Does the child grow?" The interesting thing to mention here is the fact that the slow learners in other subjects may do just as well in the natural science lesson as do their quicker classmates. It is wonderful to note the interest, the observation powers, and the alertness of those pupils whom the classroom teacher has already pointed out as being her problems both in discipline and academically. Many times the motivation of the natural science lesson serves as a stimulus for the slow reader to work harder so as to be able to read the science books.

As a final analysis, it can be said that the success of

the Audubon program is in a great measure due to its being within the realm of the everyday experiences and curiosities of the child; it is uniquely presented because trained specialists do the teaching; it satisfies the desires of the child growing out of his immediate interests; it is a course in natural science rather than about natural science.

The number of classes and pupils reached has greatly increased during the past decade, it is true, but still the majority of the children in the Commonwealth are not exposed at all to this phase of knowledge. It is the aim of the Society, however, to continue on a demonstration basis its encouraging progress in this field.

For the benefit of those school systems which do not have the Audubon teachers visit them, the Society has available a good collection of visual aids. What they are, and how they can be obtained is discussed under the following section of this thesis.

The Massachusetts Audubon Society's educational work and philosophy has the approval and sanction of the Massachusetts State Department of Education. This is true to such an extent that three Audubon staff members are on the Committee of the State Department of Education which is preparing a new course of study in science for elementary grades, four to six.

C. ADDITIONAL YOUTH EDUCATION SERVICES

1. Visual Aids

The very first visual aid that the Society had was its

Bird Chart. The first one was published in 1897. There are four charts available:

Number One -- Twenty-six Common Birds

Number Two -- Twenty-six Common Birds

Number Three -- Twenty Winter Birds

Number Four -- Twenty-three Migrants

Numbers One and Two were drawn by Edward Knobel under the direction of Ralph Hoffman. Numbers Three and Four were drawn by Louis Agassiz Fuertes. They are drawn in water color, lithographed and mounted on cloth, size 27x42 inches, on wooden rolls. The price of each chart is now $4.50. The complete set of four is $16.00.

They are used extensively in schoolrooms, libraries, museums, scout meeting rooms, playrooms and nurseries.

The Traveling Lectures started in April, 1927 with the first three, are now eight in number:

Number One -- Invitation to Bird Acquaintance.

Number Two -- Familiar Birds of the Countryside.

Number Three -- Attracting Birds in Winter.

Number Four -- The Birds Return from the South.

Number Five -- Housekeeping of the Birds.

Number Six -- Our Bird Friends.

Number Seven -- Countryside Birds.

Number Eight -- Winter Birds.

Numbers One to Five are 3¼x4 inch stereoptican slides, whereas Numbers Six to Eight contain 2x2 inch Kodachromes.

Boston University
School of Education
Library

Each set has thirty slides. Each slide has a companion 3x5 inches index card on which is written information about the bird shown in the slide. While the bird's picture is projected on the screen, the children are hearing about him. This written material is in two editions: (1) for adult or high school groups, and (2) for intermediate grades.

The fee charged for these Traveling Lectures is $1.00 per set per week, plus return transportation charges.

In addition to the slides compiled in these eight sets, the Society also has a valuable collection of five hundred lantern slides, 3¼x4 inches, which are also available for lecture purposes, but do not have accompanying information cards. These stereoptican slides are colored and most of them are taken from actual photographs. They include most of the birds found in Massachusetts and illustrate interesting phases of bird protection. They may be examined at the office and selections made for the bird lecture to be given, or listings received by mail will be filled as completely as possible.

In the sales department of Audubon House, a wide variety of books, bird houses, bird feeders, bird paintings, letter paper, ceramics, and "knick-knacks" are handled. The following are considered as visual aids in teaching:

Audubon Bird Cards

Spring, Summer, and Winter sets
50 cards per set; colored picture of the bird, with information on reverse side; $1.50 a set.

Post Cards

Birds and flowers
Some in color; others in sepia tone $ .05 each

Games

Bird Lotto	1.50
Animal Lotto	1.50
Flower Lotto	1.50
Goldfinch, a bird card game	1.00
Monarch, a butterfly card game	1.00
Larkspur, a wildflower card game	1.00

The following series of books are highly recommended for children's reading:

The Row-Peterson Basic Science Education Series, well illustrated in color, on primary, intermediate, and junior high school grades .35 each

The Out of Doors Stories, by C. J. Hylander
Out of Doors in Spring, Summer, Autumn, Winter 1.50 each

Wildlife Tales, by Henry B. Kane
The Tale of the Crow, Bullfrog, Promethea Moth, Whitefoot Mouse, White-faced Hornet, Canada Goose; each beautifully illustrated with photographs by the author 1.75 each

The Thornton Burgess Stories
Adventures of Jimmy Skunk, Peter Cottontail, Grandfather Frog, and other friends .85 each
Some longer stories 1.75 each

The following are excellent for reference:

Bird Study for Schools: Electric Nature Games, by R. T. Peterson	.10
Whose Nest Is That? by Richard Headstrom	.15

The following albums are the latest development in auditory aids for nature study:

Bird Song Records, set of six records, containing 72 bird songs $8.50

Voices of the Night, calls of 26 eastern toads and frogs on 4 records 6.50

2. Free Material

The free material circulated by The Massachusetts Audubon Society consists chiefly of reprints of articles published in its monthly magazine, The Bulletin. The following titles are available, and are suitable for the use of teachers:

Help the Birds Find a Home, by C. Russell Mason and William A. Taylor. Directions for building bird houses.

Feathered Benefactor and Miscreant, by Dayton Stoner. Information on the yellow-bellied sapsucker.

Invite Your Bird Neighbors to Dinner, by Edwin A. Mason. "What food for what birds."

Doctor to the Birds, by William A. Taylor. Feeding fledglings and nestlings.

Capturing Youth for Conservation. Nature instruction in the public schools.

Refuges for Wildlife Provided by the Massachusetts Audubon Society. Story of the sanctuaries.

Do You Know Your Birds?, by C. Russell Mason. Hints on identification.

Education: The Spearhead of the Audubon Program. An inside look at early Audubon classes.

Birds of Mt. Greylock, by Dorothy E. Snyder.

Massachusetts Looks at Conservation Education, by C. Russell Mason. An address delivered before

the American Nature Study Society at Boston, December 28, 1946.

Birds Are Found Round the World -- on Postage Stamps, by C. Russell Mason.

Animal Autographs, by Ernest C. Driver. Secrets of the night.

A Private Pioneer in Public Education. A report of the Educational Committee.

Binoculars and Telescopes for Bird Study, by Rosario Mazzeo. Valuable information concerning the "badge of the trade".

White-winged Gulls, by Frances L. Burnett.

An Ornithologist Looks at the Waterfowl Problem, by Ludlow Griscom. An address delivered at the Annual Meeting of the National Audubon Society in New York, October 22, 1946.

Massachusetts Rails, by Ludlow Griscom.

Massachusetts Alcids, by Martin Karplus.

Tenants of an Old Stub, by Daniel and David Grice.

The Barn Owls of Martha's Vineyard, by Ludlow Griscom.

Notes on the Pacific Loon, by Ludlow Griscom.

The Mergansers of Massachusetts, by Cora B. Wellman.

Difficulties with Massachusetts Gulls, by Ludlow Griscom.

Build Bird Population with Food Plants, by C. Russell Mason. A reprint from Arnoldia, Arnold Arboretum, Harvard University.

Parasitism by Protocalliphora and Management of Cavity-nesting Birds, by Edwin A. Mason. Reprinted from The Journal of Wildlife Management.

The pamphlets kept in continuous stock are: Help the Birds Find a Home, Invite Your Bird Neighbors to Dinner, and Animal

Autographs. Naturally, the Society is not in a financial position to distribute even these publications in large quantities, but requests for a reasonable number of copies are complied with immediately. The remaining material is reprinted in a large initial quantity and is available until the stock is diminished. Further reprints are not made, therefore the limit of one to a person is necessary.

This free literature is distributed to youth group leaders, teachers, and other interested people at the rate of approximately 10,000 copies annually.

3. Audubon Junior Clubs

Audubon Junior Clubs were started by the National Audubon Society in October, 1910. (The National Audubon Society was incorporated in 1905 in New York City. Its present headquarters are at 1000 Fifth Avenue, New York, N. Y.).

In order to form a Junior Audubon Club, a leader and at least ten children must organize and pay their dues to the National Audubon Society. The fee was ten cents until 1947, when it was raised to fifteen cents. Upon receipt of this application, National Audubon sends to the Club leader the Audubon Teachers Guide; six pamphlets on local birds, with a colored picture and a blank one to be colored for each member; and a button for each member. Four times during the year the Club receives a four-page newsletter telling of the activities of other clubs throughout North America. In

Massachusetts the handling of Audubon Junior Clubs is in the hands of The Massachusetts Audubon Society.

The objectives of Audubon Junior Clubs, as stated in the Teachers Guide[1], are:

> Explore out of doors -- See for yourself! ... Approach nature study in the spirit of adventure! ... It is fun to know about birds! ... A study of birds soon becomes a study of all nature ... Understanding some of these relationships leads to a greater appreciation of wildlife, to its more intelligent protection, and provides good lessons in conservation.

The Guide is an excellent source book, giving activity, suggestions appropriate for every month of the year, as well as chapters of background information for the leader.

Over 300,000 children are enrolled in from 14,000 to 15,000 clubs each year. Recently, the eight millionth member was enrolled. Since one of the early aims of The Massachusetts Audubon Society was to interest children to have a love for birds and their protection, it was natural that they should be quick to adopt this particular program of the National Society.

At the present time, the Massachusetts Society is one of the best auxiliary promoters of the Junior Clubs. Each educational staff member usually succeeds in forming a club, under the leadership of the classroom teacher, in every classroom which he visits. Other grades in the school often become interested and form a club, too. In Massachusetts, approx-

1 Audubon Teachers Guide, National Audubon Society, New York, edited by Dorothy A. Treat, p. 1.

imately four hundred clubs, containing about 10,000 members, are enrolled annually.

The six bird pamphlets serve as the foundation for a notebook which the child is urged to keep.

Each year the six pamphlets and the button are, of necessity, different, as many children join year after year.

The pamphlets are in two editions: the junior edition, with large type and simple text, for grades below the sixth; and the senior edition, with smaller type and longer text, for grades above the sixth.

The amount and quality of activity done in each club depends on the enthusiasm of the individual teacher, and the amount of time she desires to devote to it.

Many people who are now professionals in the field of nature recreation and conservation claim to have gotten their start as a result of being Audubon Junior Club members.

4. Natural History Day Camps

Natural history day camps were started at two of The Massachusetts Audubon Society's Sanctuaries during the summer of 1947. The purpose of the day camps is to give the child a well-rounded background in natural science and conservation, and no better place can be found for this purpose than a Sanctuary, where conservation is the whole theme of its existence. Certainly this is in direct contrast to the general run of day camps in which nature study may enter the program once or twice a week, and then, for only a short period.

Each of the three Natural Science Day Camps is directed by one of the teachers of the Society, but she works in close cooperation with the Sanctuary superintendent.

The biggest problem in operating a day camp at a Sanctuary is one of transportation. Since the Sanctuary is, of necessity, in a rural, wooded area, the campers are drawn from the urban or suburban areas at some distance from the Sanctuary.

Some youngsters walk as much as two miles each way to camp, and others ride bicycles as much as three miles each way. The remaining children are taken to camp by taxi or parents.

The months of July and August are divided into four two-week periods. The size of the group for each period is limited to fifteen boys and girls between the ages of nine and twelve. Many of the youngsters are those who have had the natural science lessons in school during the school months. They know that "nature is fun" and they are extremely eager to learn more, thus proving the effectiveness of the program.

As for the program at the day camp, it is somewhat similar at each of the Sanctuaries, but, of course, varies according to the peculiar environment of each of them, as well as varying according to the interests and needs of each group of campers. A typical program was outlined by the

Arcadia Sanctuary Day Camp Director[1] in the October, 1947, Bulletin of The Massachusetts Audubon Society:

> The day's program began at 9:30 with a look at the daily quiz question, followed by attention to the feeding and cleaning of the rabbits, mice, snakes, and turtles.
>
> Since our objectives were to arouse the child's interest in the out-of-doors and to make him feel at home in the woods, we did a great deal of hiking around the trails of the Sanctuary. These field trips always had a definite objective, such as birds, soil study, trees, or wildflowers. But anything that a camper happened to see and ask about became the subject of discussion for the moment. When trees or wildflowers were the major interest of a trip, we would always assimilate the information gained with a game, which would be fun, but also serve as a review. Bird books and bird cards were studied both before and after a bird walk, and the children recorded on a chart a daily list of birds seen and heard.
>
> The weekly boating and fishing trip was always a highlight in the program. Boating skill and safety, fishing knowledge and conservation, and aquatic plant study were the objectives of this particular activity.
>
> The handicraft activities included blueprints and spatter prints of leaves for the camper's notebook, finger painting, plaster of Paris casts of leaves to serve as paperweights, and attractive pins of cedar wood. Some lovely terraria were constructed, too.
>
> One day of each two-week period was devoted to a trip to the Mt. Tom State Reservation, where the campers particularly enjoyed the Trailside Museum. Climbing either the Bray tower or the Goat's Peak tower was an adventure, especially on a clear day when the children could see the Sanctuary in the valley below.
>
> Rainy days were fun, too. Then we enjoyed lantern slides, bird song records, charades, group singing, folk dancing, conservation stories, or work on notebooks.

1 Mildred F. Donnelly. Day Camps at Sanctuaries Had Good Season. Bulletin, The Massachusetts Audubon Society, October 1947. Volume XXXI, Number 6, pp. 237-8

> About every other day we cooked part of the noonday meal at the outdoor fireplace on our camp site. One night a small group slept out.
>
> Being at Arcadia was a decided advantage for the children. Here they were able to observe bird-bandings, watch many birds at close range at the feeding stations, and examine the experimental hedge of the Soil Conservation Service and other food and cover plantings. They were able really to get the feel of a sanctuary and so more readily to acquire a conservation attitude and a love and appreciation of Nature's wonders.

This day camping program of the summer of 1947 was experimental. It proved definitely worthwhile both to the children who attended and to the teachers who directed. Youngsters are extremely interested in their surroundings, and all too often there is no one to whom they can turn to ask a puzzling question. Of the Audubon teachers, however, they receive satisfactory answers. This does not mean that the Audubon teacher knows all the answers. It means that he knows where to find it, and child and teacher always look up a hard question together, so it is often a learning experience for both of them.

So it was that there was demand for continuation of the Sanctuary Natural History Day Camp program at both Sanctuaries again in 1948, with Pleasant Valley Sanctuary joining Moose Hill and Arcadia in this endeavor.

This program, now established, will continue as long as there is demand, and the administrators of the Audubon Society suspect that this will mean indefinitely, another example of the Massachusetts Audubon Society's unique program for conservation education.

5. Camp Visits

Another phase of summer work carried on by The Massachusetts Audubon Society is its program of camp visits. This program was inaugurated in 1942 for two reasons: first, the Society's desire to provide a service whereby good nature work could be done in local camps, and second, the request of camps themselves for qualified nature personnel.

The Society has two methods of filling this demand. The regular teaching staff members, since they are engaged on the year-round basis, are available in the Summer for visiting camps and doing work similar to what they do during the school year, but naturally, on a completely out-door basis.

For the Massachusetts Conservation Council, consisting of fifteen state-wide conservation organizations, The Massachusetts Audubon Society directs the operation of the "Conservation Van." The Van is a large truck managed during the summer months by two men students in the Nature Recreation curriculum at the University of Massachusetts. It is also referred to as the "covered wagon" because of its shape and its characteristic outside painting. It is equipped with sleeping facilities.

The Covered Wagon's first season was in 1939. With the war taking its eligible personnel, it was discontinued in 1942, and resumed in 1946.

The function of the Covered Wagon is to visit public and private camps, and playgrounds, to put on a full day's nature

program.

The Covered Wagon is equipped with cages for housing living specimens of reptiles and amphibia, drawer space for insect and mineral collections, and printed material for distribution. The program which the boys set up in each camp consists of the following parts:

1. Discussions with small groups gathered around the Covered Wagon concerning the material presented.
2. Nature trips with small groups of children to investigate the camp proper or surrounding country-side.
3. Discussions with the nature counselor or camp director, or both, on building a marked nature trail, setting up a live museum, arranging a nature corner, or some similar problems which will have a carry-over value for future groups coming to the camp during the summer.
4. An evening fireside program of movies or Kodachromes for the whole camp assembly.

Among the advantages of the Covered Wagon's visits is the fact that it can stay at a camp <u>all day</u>. In this way, its staff can reach all the children of a camp twice, in a small group and collectively at the evening program. There is also time during campers' rest hour for work with the

Counselors. Another advantage is that the size of the truck allows for the carrying of bulky equipment, such as live specimens, preserved material, inorganic objects, and specimens which cannot be found at every camp site.

The Covered Wagon visits approximately thirty-five camps during a summer. The charge for this service is $18.00 per day, which covers about one third the cost of operation.

Some observations made by the operators of the Covered Wagon concerning the nature program at the camps visited are:

1. In too many camps, both large and small, there is no special nature counselor; any nature study supplied to the children is scant, and by persons with limited background.
2. The majority of camps make no provision for a nature hut, cabin, or corner; no provision for live material; no nature trails; occasionally a nature bulletin board.
3. If there is a special nature counselor, he is quite often a botany, zoology, or geology major, who knows the college textbook, but is not a field naturalist, does not know nature activities, and does not know how to interest or handle children.
4. Consequently, many children do not like nature study. They consider it too hard, or uninteresting, or "sissy stuff."

The Society, then, is conscious of this deplorable lack of competent nature specialists, and is endeavoring to interest and to train more young adults for this profession through its program of adult education which will be discussed in a future portion of this thesis.

As for the program conducted by the regular teaching staff, it is similar to that conducted by the Covered Wagon, but the visits to the camps are on a weekly basis, and for a shorter period of the day. For the most part, the visits are to day camps in the Metropolitan Boston area which accounts for the shorter stay.

Since the staff person is usually using public transportation facilities, it is harder, too, to carry specimens. Therefore, the program depends more on the immediately available material of the location, but in this way serves to demonstrate to the group leader the possibilities of having an interesting and vital program with very little equipment.

The charge for this service is $10.00 per day.

Some of the organizations which have made use of this service during the past years are the Boston Camp Fire Girls, Lynn Jewish Community Center, Boston Council of Girl Scouts, Algonquin Day Camp, Hecht House, and Brookline Girl Scouts.

The reaction of the children to this program is remarkable. They thoroughly enjoy it and continually ask, "Why don't you come <u>every</u> day?"

6. Recreation Groups

The Massachusetts Audubon Society's work with recreation groups is quite similar to its camp visiting program, the difference being that recreation groups are visited during the school months. The contract is usually for a period of ten Saturdays, or ten weekly meetings after school on some week day.

The sponsor of this type program is usually a town Park Department or a private recreation organization. A central meeting place for the youngsters and nature leader is either a public school or public library, where facilities are available for movies or Kodachrome slides on a rainy day. On all fair days outdoor trips are taken.

The children who desire to participate in this program sign up in advance with the sponsoring organization. The group is limited to twelve children, as this is the maximum number the Audubon teacher prefers to handle in outdoor work, both from the standpoint of discipline and for the sake of all being able to see and hear the objects being enjoyed on a field trip.

If youngsters drop out of the group by virtue of two consecutive absences, those on the waiting list eagerly take their place.

The type of program has met with outstanding success in Wellesley, sponsored by the Park Department, and in Medford at the Stabile Recreation Center.

The fee charged by the Audubon Society is $10.00 per day, the same as for camp visits.

The only slight disadvantage to this program is that it is usually a changing group, and it is a question how much is inculcated in the child in the way of information, interest, and good outdoor habits. There is little opportunity for carry over since the group has no actual place to call their own. The use of the library or school is merely a courtesy.

However, it is hoped that in the long run, at least in a few of the youngsters reached by this rather limited program, some interest in the out-of-doors will be awakened. If this is the case, it is certainly one path opened on the road away from juvenile delinquency.

7. Tales of the Wildwood Series

Ever since the Tales of the Wildwood Series of three children's lectures began in March, 1946, they have been attended by capacity audiences. This part of the Society's youth education program is presented on Saturday mornings in Boston, and in the late afternoon or evening on school days in six other cities of the state.

The series, which usually consists of two or three programs, is presented at convenient intervals during the winter months.

Nationally known authorities on wildlife bring with them their equally famous movies to present an interesting, colorful, and educational program for the children. In the school

classes which the Audubon teacher visits, attendance at the lecture series is encouraged, and sometimes a whole class will come to the program with the classroom teacher and parents.

The programs are open to the general public, and adults may also attend, but the calibre of the lecture is geared for children.

D. THE SANCTUARIES

The Massachusetts Audubon Society owns and operates five wildlife sanctuaries and cooperates in the operation of a sixth sanctuary in widely separated parts of the Commonwealth, thereby supplying diversified environments for furred and feathered friends.

The purpose of each sanctuary is:

1. To supply a haven for wildlife.
2. To demonstrate what can be done for wildlife conservation in the yard of anyone's home.
3. To carry on a conservation educational program for both youth and adults.
4. To engage in research projects relative to wildlife.

To this end, four of the sanctuaries have resident superintendents and are open all day, every day of the year. At the remaining two, one is maintained only for the banding and study of large tern colonies, the other, a small one, as an

oasis for migrants over a built up area. Each superintendent is a wildlife management specialist and so is well qualified to carry on his valuable work. His duties are manifold, but consist chiefly of feeding, photographing, banding, and recording the bird population of his sanctuary. He acts as a host to visitors, conducting either individuals or groups around the trails of the property while explaining the projects of the sanctuary current at the time. He maintains an office -- museum -- salesroom. He may teach the Audubon courses in the local schools, and often lectures before local adult club groups. He keeps the trails in order, with directional signs, and labels for the rare plants. He conducts experimental plantings of grasses and shrubs to find the best and most easily grown natural animal foods. One of his most important contributions toward increasing our knowledge of wildlife is his constant observation of bird population trends, dates of arrival and departure on migration flights, nesting and feeding behavior patterns, and the banding activities. For these reasons, interpretation of wildlife interdependence, its place in the balance of nature, and its need for conservation has developed a great deal in the past decade.

The oldest sanctuary of the Society is Moose Hill in Sharon. It was established in April, 1916, when Dr. George W. Field gave his 225 acre estate for use as a sanctuary. However, the owners of adjacent property on all sides of the Sanctuary are sympathetic with its objectives, and so they too

have posted their land against hunting, thereby increasing the total protected area to more than 750 acres.

Practically the total area of this Sanctuary is forested area. For this reason, it attracts the upland game and song-bird species. For this reason, too, the major research projects have been with types of bird houses, bird feeding stations, and types of bird food. As a result of these experiments, the best general food for a feeding tray has been found and includes chiefly sunflower seeds, millet and peanut hearts.

A "Moose Hill Stick Feeder" is simply a small log with a few holes drilled in it. The holes are filled with peanut butter and hung from the branch of a tree. This is most attractive to chickadees, nuthatches and woodpeckers. Wire boxes or string bags of suet on a tree are also attractive to the chickadees, nuthatches, and woodpeckers.

The Moose Hill Sanctuary has been the host to both the Girl Scouts and the Camp Fire Girls for several years in extending to the councils of each of these groups the facilities of the Sanctuary for use in day camping.

Ever since its first season as a Massachusetts Audubon Society Sanctuary, a feature of the Springtime is "Bird Day at Moose Hill." It is a general get-together day for members and friends of the Society who gather to enjoy the bird life and wildflowers of the yard and trails of the Sanctuary.

As has already been mentioned in a previous section, a

Natural Science Day Camp was operated by the Society at the Sanctuary beginning with the 1947 summer season.

The Arcadia Wildlife Sanctuary was established in Northampton in December 1932, when its owner, Mr. L. S. Combs, notified the Society that he had posted the land against hunting. This beautiful area did not become an Audubon owned Sanctuary until the winter of 1943-1944 when Mr. Zechariah Chafee, Jr. purchased the property from Mr. Combs and presented it to the Society in memory of his son, Robert Searle Chafee. Its distinct feature is its extensive marsh which is a wonderful resting spot for migrating water fowl as well as a breeding area for water fowl. The Sanctuary is situated on the shore of the Ox-bow of the Connecticut River, and thus is right on the Connecticut Valley flyway. To see the hawk flight in late September is indeed a thrill. Arcadia also has an extensive forested area, and a smaller area of fields and meadows. Consequently, it is host also to upland game, warblers and finches, as well as to those species which inhabit the fields. Its mammal population is large and diversified, too.

In cooperation with the United States Soil Conservation Service, the Superintendent of Arcadia has been carrying on experiments in hedgerow plantings for the purpose of growing a natural fence; research in the productivity of certain berrybearing shrubs; a feed strip of grain; and experimental plants for holding back a sandy bank which is subject to

erosion.

Each year students from Smith College, Amherst College, and the University of Massachusetts avail themselves of the facilities of the Sanctuary for help in their study of wild-life management, ecology, forestry, botany, and allied subjects.

Arcadia is also a mecca for children of all ages, who arrive on a Saturday or a vacation day and stay all day. Girl Scout and Boy Scout troops also take advantage of the Sanctuary for their Nature and Out-of-doors badge work.

The Pleasant Valley Bird and Wild Flower Sanctuary in Lenox, embracing nearly a square mile of lovely Berkshire territory was first started in 1929. Early in 1943 the Pleasant Valley Sanctuary Corporation affiliated with The Massachusetts Audubon Society and the Berkshire Museum for the cooperative operation of a Conservation Education program in that region. Pleasant Valley's distinct features are its mountain, (Lenox Mountain) and its colony of beaver, leading normal, unmolested lives. A great many summer residents and tourists in the Berkshires visit this Sanctuary, which has one of the best instructive nature trails in the country. The large red barn museum has an interesting collection of Colonial antiques. One wing of the barn houses the live natural history museum.

The research at Pleasant Valley is concerned chiefly with bird banding records and interpretation, but there has also

been cooperation here with the U. S. Soil Conservation Service in planting a feed strip of grain and a hedgerow of berry-bearing shrubs. An improvement cutting and thinning demonstration area is set up in cooperation with state foresters.

At the end of the school year in June, 1946, Pleasant Valley Sanctuary inaugurated a one week Nature Leaders' Training Course. The course, given by one of the Audubon teachers in that area and the Sanctuary director, endeavored to give opportunity to interested young people to receive training for the numerous camp counselor positions available in the Berkshire region. Offered again in 1947 and 1948, the average enrollment was ten students.

All three Sanctuaries are host to the neighboring school classes in Spring. The classes in which the Audubon Society teacher gives a bi-weekly lesson come as part of their course, but many other interested teachers bring their classes for an educational trip, too.

Aside from the value of these Sanctuaries in the propagation of conservation education, their aesthetic value can not be over-estimated. Each is a wonderful spot for man as well as beast to find a haven of seclusion, rest and beauty.

Since the writing of this thesis was begun, a new gift of land has been willed to the Massachusetts Audubon Society for the specific purpose of its being developed into a Sanctuary. The area, known as Cook's Canyon, is located in Barre, a section of Worcester County, which is relatively undeveloped

by the Massachusetts Audubon Society. Because this is such a recent acquisition, it is impossible to say exactly how it will be developed. At first glance, however, it is indeed a wonderful spot. It is in an area where little observation and research in bird life has been done. The buildings on the property will make comfortable living quarters for a superintendent and his family, and provide space for a museum.

The Natural Science Workshop for Training Counselors and Teachers, inaugurated in 1948 at the Rivers Country Day School in Chestnut Hill, will this year be held at Cook's Canyon, one reason being the available space for resident quarters.

Tern Island, off the coast of Chatham, is a breeding area for thousands of common, roseate, and arctic terns. Extensive banding operations are carried on there by the staff of the O. L. Austin Ornithological Research Station at Eastham. Data gathered as a result of these studies is providing a fund of information concerning the nesting habits, migration routes, and the life span of this type of bird.

The Maple Swamp Sanctuary in Nahant is another recent gift to the Society, acquired in 1947. Due to it geographical location on the peninsula of Nahant, it is a much needed resting spot for migrating warblers, tired after their journey up the Atlantic flyway.

Although a very small area, it is an essential one, due partly to the fact that Nahant is quickly becoming a built-up residential area. Therefore, resting and feeding territory

for the birds becomes increasingly smaller. A total of 136 species has been observed at the Maple Swamp over the past ten years.

For a number of years the Society owned the Annie H. Brown Sanctuary of sixteen hundred acres on Plum Island. A resident warden, with extra assistants during the hunting season, was employed. In 1943 condemnation proceedings were started by the Government and the area around and including the Sanctuary became the Parker River National Wildlife Refuge.

E. ADULT EDUCATION

1. Audubon Nature Theatre

The Audubon Nature Theatre is a series of lectures for adults presented by prominent wildlife specialists. There is no record to tell exactly when this part of the educational program was launched, but it goes back to the very early days of the Society, certainly to 1917.

The lectures are held at convenient intervals during the winter months. Members of the Society have the opportunity to take advantage of the special members' course rate and the advance sale of tickets, but the general public is cordially invited to attend and enjoy the programs.

In order to reach as many people as possible, the program is presented in from three to five localities of the Commonwealth, such as, Boston, Worcester, Northampton, Springfield and Pittsfield. Usually, a museum or civic organization will

cooperate on the sponsorship of the series in cities other than Boston.

During recent years, the series has consisted of two to three lectures. The specialists who offer the program are not only experts in their particular phase of wildlife and conservation, but are also outstanding photographers and entertaining speakers.

2. Staff Lectures

The practice of presenting lectures on bird life is almost as old as The Massachusetts Audubon Society itself. The purpose of the programs presented by the lecture staff is for the education as well as for the entertainment of the audience. The Society has a variety of silent movies, in color, which are presented before many different types of groups, such as the P. T. A., Women's Clubs, church clubs, Garden Clubs, Scout groups, as part of a museum program or as part of a conference. The lectures available in 1949 are:

A Bird Sanctuary for Everyone
North Along the Labrador
From the Bay to the Berkshires
Attracting Birds to the Garden
Adventuring with Wildlife
Wealth of Woodland Trails
Voices in the Woods
Birds of the Marshland

Bird Study as a Family Hobby

Travels with Vanishing Birds

With the Waterfowl

The Voices in the Woods lecture consists of kodachrome slides and the Cornell Bird Song records. The program's duration is approximately one hour, with opportunity allowed for questions and a discussion period. The honorarium is $15.00, plus expenses of the lecturer, in return for which the Society gives active annual memberships to five individuals in the sponsoring organization.

During the year, nearly two hundred and fifty such programs are presented by the lecture staff.

The newest addition to the Society's film library is the color movie, Conservation in Action. This reel was filmed by Dr. John B. May, of the educational committee, during a tour of inspection with the camera. Its purpose is to show the members of the educational staff of the Society as they work with youth groups in their school classes, at recreation centers, and at the Sanctuaries. Since it is a promotional activity, it is shown, without charge, to any interested organization.

3. Courses at Audubon House

In keeping with its policy of conservation education for all ages, The Massachusetts Audubon Society certainly does not neglect the adults. Courses are offered at Audubon House

during the Fall, Winter and Spring to introduce people in all walks of life to the wonders of natural science.

One type of course offered deals with straight bird identification. It is designed to aid the beginning bird student, as well as the one who is slightly more advanced. Given in the evening, it is attended by college students, business and professional people, and even housewives, all with the common desire to know more about the avian world.

The other type of course, classified as a Workshop, is expressly for teachers, Scout leaders, and prospective camp counselors, but others may also enroll. Its purpose is to acquaint them with the life in the out-of-doors as well as to show them methods for dealing with children in planning a purposeful nature program. This course is called a Workshop since it includes lectures, demonstration, and field trips, and is developed around the interest, backgrounds, and problems of the group assembled for it.

The Workshop series is given in both a morning and an evening section, with Saturday field trips. The morning course is chiefly for the convenience of housewives who make up the great majority of Camp Fire Girls' and Girl Scout leaders.

The adult courses are limited to a small enrollment so as to allow for as much individual attention and concentrated study as possible.

4. Bus Trips

The regular monthly bus trips of The Massachusetts Audubon Society are an interesting experience for both the new-comers and the old-timers. On one Sunday each month, promptly at 8:15 A.M., one or two 40-passenger busses, fully loaded, leave Audubon House, headed toward Essex County's coastline or inland ponds and marshes. The bus fare and guide fee for the trip, which returns to Boston at 7:00 P.M., is $2.50. It is limited to members of the Society and their guests.

The group is a motley one of young and old, new and experienced birders, from many stations in life. Under the expert guidance of the leaders in charge, the best spots for the most birds are visited. A trip is seldom completed without spotting at least one rarity. It is not unusual for the combined group list to total one hundred species sighted during the day's trip.

Through these field experiences, the bird-hobbyist has the best possible opportunity for observing the birds in their natural habitat, and by regular attendance over a period of time, he soon becomes aware of population trends, the seasons for the various species, and the effect of environment on animal life.

In many cases, due to the experience gained as a result of the bus trips, the hobby develops into an avid avocation, and the individual birder becomes a valuable asset to the

Society as a reliable field observer, doing studies on his own and much more frequently than the once a month trip. The more contributors to the records which the Society keeps naturally make the data more indicative of the actual status of bird population.

Aside from the scientific value implied, the bus trips serve the aesthetic desires of many of the members attending. Many individuals go for the sheer joy of bird observation and to get out-of-doors. More important, however, is the fact that the people enjoying the activity of the monthly trip are also becoming aware of the bird conservation problems of the Commonwealth. Education in conservation is really a by-product of the trip, but its influence is noticed in the members' attitudes by the questions they ask and by the way they support the Society's conservation program.

5. Campouts

The program of campouts is another distinctive feature of The Massachusetts Audubon Society's effort to give adults the opportunity to enjoy the out-of-doors while at the same time studying the wild animals and plants.

The first campout was held in the Berkshires on the second week-end in June, 1941. Due to transportation difficulties during the War, the next campout there was not held until June, 1946.

Participants in the campout divide into two groups during the day, with one group exploring Mt. Greylock and the other

investigating the life in the Valley. The groups are reversed on the next day. At the end of each day, the whole group assembles either at the Pleasant Valley Sanctuary or at the Berkshire Museum to compare notes on the "finds" of the day's trip.

Each person provides for his own sleeping arrangements, either at a hotel in Pittsfield or by sleeping out at the Sanctuary or on Mt. Greylock.

The first Cape campout was held in September, 1942, but the same difficulties of War prevented the planning of another until September, 1946, on the week-end following Labor Day.

The headquarters for this campout are located at Chatham. Of the fifty members attending, some may camp in the Nickerson State Forest, while others use available tourist homes.

The program here consists of trips for observation of shore birds and land birds, and an excursion by fishing boat for sighting sea birds. Study of plant life and seashore invertebrates cannot help but be included. Usually the members on the Cape campout are favored with a migration wave of either land or pelagic birds. On a few occasions they have seen extreme rarities.

The Connecticut Valley campout has been held on the second week-end in May since 1946, with headquarters at the Arcadia Wildlife Sanctuary, Northampton.

Registration here is also limited to fifty persons. Some of those attending sleep at local tourist homes, but the

stalwarts make use of the excellent camping facilities on the Sanctuary grounds.

During the two days of the campout, the members disperse into small groups by choosing one of the guided field trips. These trips might be around the Sanctuary, to Mt. Tom, along the shores of the Connecticut and Manhan Rivers, or to the dinosaur ledges. Outdoor breakfasts and evening campfires serve to bring the whole group together before and after the trip of their choice.

It can be said with certainty that everyone enjoys the campout, whether it is on the Cape, in the Connecticut Valley, or in the Berkshires. It is a healthy, happy experience in the great outdoors, which enables people of a similar hobby, but diversified professions and backgrounds, to associate on a common ground. These experiences are easily translated into good conservation attitudes by these intelligent adults.

6. Natural Science Workshop

An attempt was made in previous sections of this thesis to indicate that most youth leaders and school teachers feel incompetent for teaching natural science and conservation, and consequently shy away from it.

Because the Massachusetts Audubon Society recognizes the need that more and more of this type of education should be made available to teachers and leaders, it is striving to do its utmost toward achieving this end.

The National Audubon Society has Nature Camps in Maine, Connecticut, Texas, and California at which a two-week course of study is offered for training in natural science work. The Rhode Island Conservation Workshop, and workshops in Ohio, West Virginia, and Pennsylvania are training teachers in conservation education. Massachusetts had no similar course until June, 1948, when the Society's Natural Science Workshop was opened at the Rivers Country Day School in Chestnut Hill.

The first period, during the last two weeks in June, was planned especially for counselors and Scout leaders, preparing to go to camp. The second period, during the first two weeks in July, was particularly for school teachers.

This was really a huge undertaking for the educational staff of the Society, but it proved a gratifying success in all respects.

The program consisted of lectures, demonstrations and field trips on the subjects of bird life, sea shore life, forestry, wildflowers, reptiles, mammals, and soil conservation. The students "learned by doing" crafts, terrarium construction, square dancing, and operation of a weather station. Visiting consultants from State and Federal conservation services as well as representatives from private organizations rendered valuable assistance. An evening cookout and campfire program was held each week.

The chief disadvantage to the Workshop during its experimental year was the lack of sleeping facilities, which necess-

itated its day camp basis.

The approaching 1949 Workshop will be held at the Society's recently acquired Cook's Canyon Sanctuary at Barre.

This is indeed an exciting new venture, because the staff will have a sense of "belonging" on its own property, but the most significant improvement is the presence of sleeping quarters. It is felt that when the students live on the premises they gain a great deal from the relationships with staff members. There is opportunity for early morning bird walks and evening campfire and star study programs. Aesthetic enjoyment is fuller, too, without the rush to arrive at school on time in the morning, and at home in the evening through heavy traffic.

Additional advantages of the Cook's Canyon location are the proximity to the Harvard Forest and the Quabbin Reservoir and Mt. Wachusett. This will allow opportunity for studying forestry, soil and water conservation within the very region.

Again this year, there will be a session in June for camp counselors and a session in early July for teachers.

At the Workshop course, the student is able to gain an intimate knowledge of outdoor life for his own information and enjoyment.

More important, however, is his gain in acquiring methods of interpreting to children the fundamentals of the balance of nature and the principles of ecology. When this is accomplished, a conservation attitude is more easily achieved and mani-

fests itself in the individual's outlook on life.

It is the desire of the Society, and of all persons interested in the imminent problems of conservation, that more adults take advantage of this opportunity for study, so that this nucleus of leaders will cause their influence to pyramid in all directions where youth will respond.

F. PUBLICATIONS

The Bulletin of The Massachusetts Audubon Society was first published in February, 1917. Its purpose was to "tell of the Society's affairs, disperse information on birds, and keep readers informed of State and Federal Legislation."

It is published monthly, except during July, August, and September, and is sent to each of the Society's approximately seven thousand members.

The contents of the Bulletin always prove interesting reading. There are articles on bird population, and behavior, reports of the school program, information on the Sanctuaries, field notes, book reviews, membership news, poetry, and notices pertaining to lectures, trips, campouts, courses, workshops and staff engagements. It is copiously illustrated with excellent photographs and line drawings. Its circulation, of course, is chiefly in the New England states, but it also extends into Canada, Mexico, South America, Hawaii, and the Philippines.

A companion publication of the Society is the Records of

New England Birds, which is published eleven times during the year, monthly except for the June-July combined issue. The Records is an interpreted compilation of the reported observations of many competent birders. This publication is an important contribution to ornithological research.

The Massachusetts Audubon Society has been publishing the Records since January, 1945. Prior to that date, the New England Museum of Natural History had published since November, 1936, the same type of data under the title, Bulletin of New England Bird Life.

G. LIBRARY

The Massachusetts Audubon Society boasts that for a private organization it has one of the largest library collections on the specialized subject of birds. The library, located on the attractive first floor of Audubon House, has two sections. The Elizabeth Loring Lending Library circulates its approximately five hundred volumes for the period of one month to members only. It contains many reference books, but for the most part it offers valuable reading for the person interested in any phase of natural history and conservation.

The reference library contains many rare volumes. However, it is an outstanding collection principally because it includes much of the valued writings by the great ornithologists of the United States. It is used extensively by students of ornithology who come long distances in order to take

advantage of its excellent material.

The Society subscribes to popular magazines on natural history subjects and these are available for leisurely perusal in the comfortable library.

CHAPTER IV

SUMMARY

CONCLUSIONS

The investigation of the activities of the Massachusetts Audubon Society in the field of conservation education reveals that the program is functioning extremely well and on an ever expanding scale.

The Society was established fifty years ago with a conservation motive. Ever since its founding it has maintained its standards as a conservation organization working in local, state and, occasionally, national circles. Since its earliest days the Society has increased in membership, administrative staff, and activities, until today it ranks as the largest Audubon Society within a single state.

Its program for conservation education is unique in that it is a private organization, with its own staff of specially trained teachers, conducting classes in public and private school systems of the Commonwealth. Although the school program was started ten years ago on an experimental basis, its valuable assets were quickly recognized by classroom teachers, school principals, school superintendents, and the Massachusetts State Department of Education, to such an extent that the service to schools has now spread to approximately three hundred classes in eighty-three cities and towns of the State.

The chief reasons for the success of this course in conservation and nature lore are the Audubon teacher's methods of arousing children's interest. The Audubon teacher takes the class out-of-doors as much as possible. He stresses the use of the senses in encouraging the development of observational powers. This is accomplished by the extensive use of visual, auditory and kinesthetic teaching aids, augmented by live material whenever feasible.

The instruction has a definitely practical side in that it is related to the child's everyday living experiences. While developing a conservation attitude, the child is also being introduced to the opportunities of leading a richer and fuller life.

The administrative staff of the Society realizes that it would be impossible for the Audubon program to extend into all grades of all cities and towns of the Commonwealth. So that those classes not enjoying the advantage of the Audubon teacher's visit will not be entirely neglected, the Society has available at very slight cost Traveling Lectures on bird life; Junior Audubon Clubs are encouraged; and other visual aids and free material are available at the Society's headquarters for the benefit of all interested teachers and youth leaders.

Summer day camp programs, work with recreation groups, and the children's lecture series are additional phases of the Society's educational program for children.

Opportunity for adult education in conservation is achieved by means of numerous staff lectures, by courses given at Audubon House, as well as on the bus trips and campouts, and at the Natural Science Workshop. The publications of the Society, and its attractive library and salesroom are additional incentives to adult participation in its program.

The Sanctuaries, located in sections of the Commonwealth convenient for both human and avian visits, are both beautiful and functional. The activities of the Sanctuaries are for the benefit of wildlife as well as for the educational and aesthetic enrichment of young and old. The research projects conducted in the field of forestry conservation, soil conservation, wildlife management and bird banding, have received attention in nationally circulated publications, and serve to demonstrate what the individual property owner can do in his own backyard.

This examination of the activities of the Massachusetts Audubon Society indicates that this private organization is performing an outstanding service to the citizens of the Commonwealth. Children, at first realizing that "nature is fun", gradually develop a conservation attitude which, it is hoped, will become an integral part of their personality. Adults who take advantage of the program offered by the Society also acquire a conservation attitude while converting a perhaps passive outdoor hobby into a purposeful leisure time activity.

SUGGESTIONS FOR FURTHER STUDY

An investigation of the following private organizations which work in the field of natural science and conservation would, in the opinion of the writer, prove worthwhile to teachers and youth leaders. To discover precisely the function and extent of the educational facilities of these organizations, and particularly to find what free materials they have available in large quantities, would be a valuable contribution to educational literature.

1. National Audubon Society
   1000 Fifth Avenue
   New York 28, New York

2. The National Wildlife Federation
   1212 Sixteenth Street N.W.
   Washington 6, D.C.

3. The American Forestry Association
   919 Seventeenth Street
   Washington 6, D.C.

4. The Children's Museum
   60 Burroughs Street
   Jamaica Plain 30, Massachusetts

5. The American Forest Products Industries
   1319 Eighteenth Street
   Washington 6, D.C.

A P P E N D I X

APPENDIX

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REFERENCE SHEETS

A. THE THREE KINGDOMS.

B. AMPHIBIANS AND REPTILES.

C. BE A CONIFER DETECTIVE.

D. HOW ANIMALS SPEND THE WINTER.

E. COMMON ORDERS OF INSECTS.

F. CONSTRUCTING A TERRARIUM.

THE THREE KINGDOMS

NON-LIVING

MINERAL

96 ELEMENTS including:

- Gold
- Silver
- Copper
- Mercury
- Aluminum
- Radium
- Lead
- Uranium
- Silicon

MANY COMPOUNDS, including:

- Water
- Quartz
- Mica
- Feldspar
- Rocks
  - Granite
  - Marble
  - Sandstone

LIVING

PLANT

NO FLOWERS (no seeds)

ALGAE (make own food)
- Seaweed
- Pond scum

FUNGI (do not make own food)
- Bacterium
- Mold
- Mildew
- Yeast
- Mushroom

LICHENS (Fungus and Alga growing together)

MOSSES

FERNS

CLUBMOSSES

HORSETAILS

FLOWERS (seeds)

GYMNOSPERMS (naked seeds) Cone-bearing trees
- Evergreens
- Larch

ANGIOSPERMS (covered seeds)

Monocotyledons (1 seed leaf, parallel veins)
- Grass
- Lily
- Orchid
- Palm

Dicotyledons (2 seed leaves, netted veins)
- Native deciduous trees and shrubs
- Many garden & wild flowers
- Most plants used for vegetables

ANIMAL

INVERTEBRATES (no backbone)

PROTOZOA (single celled animals)

SPONGES

JELLYFISH

WORMS

ECHINODERMS
- Starfish
- Sand dollar
- Sea urchin

MOLLUSKS
- Snail
- Clam
- Octopus

ARTHROPODS (hard, jointed outside skeleton)
- Crustacea
  - Barnacle
  - Sowbug
  - Crab
  - Lobster
- Centipedes & Millipedes (many legs)
- Spiders & King Crab (8 legs, 2 body parts, no feelers)
- Insects (6 legs, 3 body parts 2 feelers usually wings)

VERTEBRATES (backbone)

Cold blooded — Temperature controlled by surroundings

FISH (gills, scales)

AMPHIBIANS (gills, then lungs: skin moist and smooth, or dry and warty)
- Frog
- Toad
- Salamander

REPTILES (lungs, dry scales)
- Chameleon
- Lizard
- Snake
- Crocodile
- Alligator
- Turtle

Warm blooded — "Body thermostats"

BIRDS (feathers)

MAMMALS (young born alive, hair, feed young milk)
- Bat
- Fox
- Whale
- Man

Massachusetts Audubon Society

AMPHIBIANS AND REPTILES

Vertebrate cold-blooded animals (body temperature controlled by surroundings)

AMPHIBIANS	REPTILES
Frogs, toads, salamanders	Chameleons, lizards, crocodiles, alligators, snakes, turtles
Skin - either moist and smooth or dry and warty. No scales.	Skin dry Scales
Eggs - usually laid in water	Eggs - always laid on land
Young - different shape from adults except salamanders	Young - same shape as adults
Breathe with gills when young (usually) " " lungs when adult "	Breathe - with lungs at all times
Claws - none	Claws - except snakes

Most of these animals are entirely harmless; however, the jaws of a large snapping turtle are dangerous. Only two species of poisonous snakes, the copperhead and rattlesnake, are found in Massachusetts, and these are very rare. The bites of other snakes are not dangerous unless they become infected.

Frogs eat mostly land or water insects. They have moist smooth skin. Their slipperiness and their ability to jump enable them to escape their enemies. They are much better jumpers than toads. Frogs' eggs are laid singly or in clusters.

Toads eat mostly insects and earthworms. They have a dry warty skin, but people cannot get warts from handling them. The eggs of toads are laid in chains.

Salamanders are often called lizards but actually they are more like frogs with tails. (Lizards have dry scaly skin and the skin of salamanders is moist and smooth.) They eat mostly insects and other small invertebrates.

Although adult frogs and salamanders have lungs they also breathe through their skin, so must be kept moist at all times. In hibernation they breathe entirely this way.

Chameleons, lizards, crocodiles, & alligators are not found wild as far north as Mass.

Snakes are very useful animals. They should not be killed because they do so much good. The small ones live largely on soft-bodied animals, earthworms, slugs, some insects, and salamanders. The larger ones feed largely on mice and other small vertebrates, frogs, toads, etc. Because a snake has no legs with which to hold down its prey, it swallows it whole and can even eat an animal bigger around than itself due to the way the jawbones are hinged together and the elasticity of the skin and stomach. Because a snake has no eyelids, it has to sleep with its eyes open. The snake's forked tongue is not a stinger but is used for smell, touch, and sound.

Turtles are among the best protected of animals due to their shell which is like a hard suit of armor. A full grown turtle has few enemies, but the eggs are often dug up and eaten by skunks or raccoons and the young turtles are often eaten by larger turtles and other water animals. Some turtles live on land and some in the water. They all lay their leathery-shelled eggs on land, usually digging a hole for them. The backbone of turtles is attached to the upper shell and the breastbone to the lower shell.

BE A CONIFER DETECTIVE!

A. Leaves needle-like.

B. Leaves dropped in fall; many leaves in bundle.....LARCH

B. Leaves evergreen, remaining all winter.

C. Leaves in bundles.....PINES

D. 5 leaves in a bundle.....WHITE PINE

D. 3 leaves in a bundle.....PITCH PINE

D. 2 leaves in a bundle (most of these are cultivated)

E. Leaves short, ½" to 1½".....JACK PINE

E. Leaves 2" to 3", bluish green and twisted.....SCOTCH PINE

E. Leaves long, 3" to 6"

F. Leaves bend easily when pushed.....RED PINE

F. Leaves stiff.....AUSTRIAN PINE

C. Leaves not in bundles.

G. Trees

H. Leaves sharp and 4-sided, (can be rolled in fingers), grow from all sides of twig; twigs rough after leaves fall..SPRUCE

H. Leaves flat (can't be rolled in fingers), 2 long white lines on under side.

I. Leaves short, ½" or less, on tiny stalks, appearing in two rows, one from either side of twig; twigs rough after leaves fall.....HEMLOCK

I. Leaves 3/4" to 1"; twigs smooth after leaves fall
BALSAM FIR

G. Shrubs or low bushes; fruit berry-like

J. Leaves flat, blunt tips, dark green above, yellowish green on under side; fruit red, usually cultivated.....YEW

J. Leaves ½" to ½"; prickly, broad white line on under side; fruit blue; found in fields.....PASTURE JUNIPER

A. Leaves not needle-like, flattened against stem and overlapping like shingles.

K. Branchlets flattened sprays, fan-like; small cones.....ARBOR VITAE

K. Branchlets not flattened; leaves mostly flattened and overlapping, some prickly; fruit blue and berry-like.....RED CEDAR

Elementary Key to the Conifers
Massachusetts Audubon Society

HOW ANIMALS SPEND THE WINTER

Some interesting facts about conditions out-of-doors in winter:

1. The frost line is the lowest point to which the ground freezes. Usually this is at a depth of only 2 to 4 feet. Below this line the ground remains unfrozen -- animals which burrow below the frost line will not be frozen no matter how cold it gets above. A deep snow serves as a blanket and prevents snow-covered ground from freezing as deeply as bare ground.

2. Ponds and streams do not freeze solid; there is only a layer of ice on the surface. Below the ice, the temperature always stays about 39°F. This is because water is heaviest at 39°F -- if it becomes colder the water becomes lighter and rises. That is why ice floats.

Differences in the body temperature of animals:

1. Cold-blooded animals have the same temperature as the air and water around them. They cannot move about in cold weather as they would be frozen solid.

2. Warm-blooded animals have an almost constant body temperature regardless of the temperature of the air or water. Only birds and mammals are warm-blooded, and only they can move about out-of-doors in really cold weather. Evergreens, thickets, weed patches, snowdrifts, etc. provide them with shelter from the wind.

Hibernation is a special kind of winter sleep which is different from ordinary sleep. The temperature may drop to within a few degrees of freezing; and the heart beat and rate of breathing is much slower than usual.
Animals that hibernate usually prepare for winter by eating heavily, thus storing up fat. This fat is often near the skin, especially in mammals, and acts as a blanket against cold. Little fat is needed as food during hibernation. Therefore, most of it is used after the animal awakes. This is important because food is still scarce in the early spring.

Migration is a movement from one place to another at certain seasons.

Insects, spiders, and other land invertebrates are cold-blooded and hence cannot move about in cold weather. They spend the winter hidden under bark, leaf mold or stones, in rotten logs, in the ground, etc. Often the adults die in fall and only the eggs live over winter. This is true of most spiders and many insects. They prepare for hibernation by drying up; otherwise they would burst when they froze.

Frogs, and turtles burrow into the mud at the bottom of ponds and hibernate. A few frogs may winter in rotten logs or under the leaf mold.

Salamanders hide in rotten logs, etc., or at the bottom of streams and ponds.

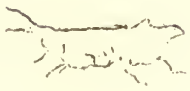
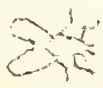
Snakes and toads find holes in the ground, and spend the winter below the frost line. Often many snakes will hibernate together in huge balls.

Fish swim about under the ice or remain fairly quiet at the bottom.

Most of our summer birds migrate south for the Winter. Likewise, most of the birds that spend the winter in Massachusetts are birds that summer farther north.

Mammals may migrate, hibernate, or remain active. Some bats migrate south. In New England we have seven mammals which hibernate either all or part of the winter. They are the bear, woodchuck, raccoon, skunk, chipmunk, jumping mouse, and bat. Most mammals are active all winter. Some store up food for the winter, as the beaver, squirrel, many mice, etc.

COMMON ORDERS OF INSECTS

ORDERS	EXAMPLE	GROWTH	MOUTH	FIELD MARKS
"Straight-winged" ORTHOPTERA Roaches, Crickets Grasshoppers		Gradual, 3 stages, increase in size	Chewing	FW leathery, HW folded lengthwise.
"Half-winged" HEMIPTERA True Bugs		Gradual change 3 stages	Piercing -Sucking	FW leathery at base, overlapping at tip.
"Wings-alike" HOMOPTERA Cicada, Leaf-Tree-hoppers		Gradual change 3 stages	Sucking	Wings transparent. When held at rest thus:
"Nerve-winged" NEUROPTERA Ant-lions Lace-wing Flies		Complete change 4 stages	Chewing	Wings equal in size, with many fine veins.
"Tooth-winged" ODONATA Damselflies Dragonflies		Incomplete change 3 stages	Chewing	Long, slender insects with long wings. Larva aquatic.
"Scaly-winged" LEPIDOPTERA Moths and Butterflies		Complete change 4 stages	Siphoning Larva: chewing	Wings covered with scales.
"Sheath-winged" COLEOPTERA Beetles		Complete change 4 stages	Chewing	FW horny, meeting in straight line down center
"Membrane-winged" HYMENOPTERA Wasps, Ants, Bees		Complete change 4 Stages	Chewing, Lapping Sucking	FW larger, HW usually hooked to FW (or no wings)
"Two-winged" DIPTERA Flies Mosquitoes		Complete change 4 stages	Piercing Sucking Sponging	One pair thin transparent wings.

FW - Front Wings; HW - Hind Wings;

3 Stages - Egg, Larva (or Nymph), Adult

4 Stages - Egg, Larva, Pupa, Adult

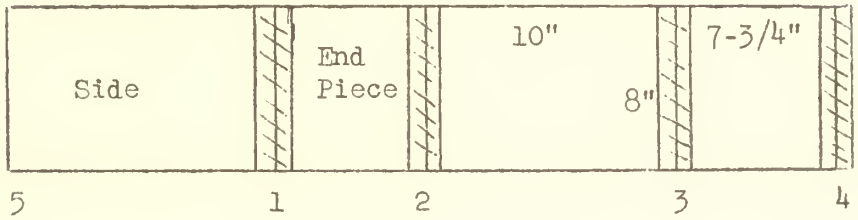
CONSTRUCTING A TERRARIUM

Materials

4 pieces 8" x 10" window glass (for 2 sides, top and bottom)
2 pieces 8" x 7-3/4" window glass (for end pieces)
5-yard roll 1" adhesive tape

Directions

Fig. 1



Cut strips of adhesive tape as follows:

4 strips - 8" long
2 strips - 10" long
2 strips - 7-3/4" long

Fasten these by one end to the edge of the table, and leave them hanging where they may be easily reached and removed. (Adhesive for taping top may be cut later.)

Lay out four pieces of glass flat on desk or table as shown in Fig. 1, separating them by a distance about the width of the glass. (If the pieces of glass are not cut absolutely alike, be sure that the bottom margin is even, although the top may be a little uneven.)

Fasten these together with the 8" pieces of tape, as shown in the diagram. Each piece may first be creased lengthwise, through the middle, to help in placing it straight on the glass. Rub the tape hard; otherwise it will not stick firmly.

Stand the terrarium up, and fasten 4 to 5. Be sure that the smaller end pieces are on the inside of the longer sides (Fig. 2) so that they will stand on the bottom piece when the terrarium is finished.

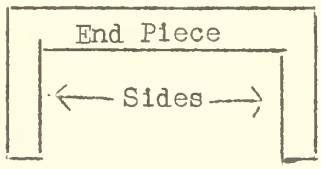


Fig. 2

Place the terrarium upside down, and fasten on the bottom (using the 10" and 7-3/4" pieces of tape). Fasten on the cover on the outside with a 10" strip of tape, and then lay the cover back at an angle, and tape the inside so as to form a hinge. -

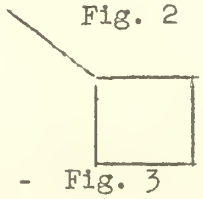
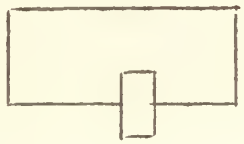


Fig. 3

The edges around the top and the edges of the cover should be taped to prevent cuts.

A handle may be made for the cover with a $2\frac{1}{2}$" piece of tape, folded with the sticky sides together. (Fig. 4)

Fig. 4



There are several ways of rendering the inside tighter:

1. Simply tape the sides and bottom on the inside. This should be sufficient for an ordinary terrarium.

2. To make the container firmer, tape the sides only, and pour a layer of Plaster of Paris in the bottom. Use a little over twice as much plaster as water and stir thoroughly to remove lumps and air bubbles before pouring. (Wipe plaster from mixing tin with newspaper before the plaster sets, and be careful that no plaster gets down a sink drain.) Four cups of the mixture will fill the terrarium to a depth of about $\frac{1}{2}$".

3. If the container is to be used as an aquarium, it is best to smear all edges and corners with aquarium cement.

Formula: 1 part red lead)
1 part litharge) ** -------- By Weight
8 parts dry whiting)

Mix with raw linseed oil to consistency of dry putty, being careful not to use too much oil. Let mixture dry a week, and then paint container.

FILLING THE TERRARIUM

Put an inch of coarse sand or gravel, mixed with charcoal, on the bottom, and add a layer of soil suitable for the kind of plants you wish to grow. A layer of moss with the green side out will conceal the layers of sand and earth and make the terrarium more attractive.

In planting the terrarium, small evergreen woodland plants may be used, such as tiny ferns, seedling evergreens, different species of moss, wintergreen, partridgeberry, etc. There is room for much imagination in planning a woodland scene, etc., including possibly a pool (mirror), brook (sand), rock, fallen log (twig), piece of rotten stump overgrown with moss, etc. A temporary addition of live amphibians, snails, or insects may lend added interest.

CARING FOR THE TERRARIUM

Water only when necessary. Good light is necessary for the plants, but too much heat or direct sunlight should be avoided. (A northern exposure is best.) Mold and fungi will thrive with too much moisture. If they develop, spray with a little powdered sulphur. The air may be changed by raising the cover for a few minutes each day, or the cover may be left slightly ajar.

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